THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, COPPER AND BRASS, THE BRASS FOUNDER AND FINISHER AND
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ELECTRO-PLATERS' CONVENTION

THE AMERICAN ELECTRO-PLATERS' SOCIETY HOLDS ITS SECOND ANNUAL CONVENTION AT CHICAGO, ILL., JUNE 4-6, 1914.

BY J. H. HANSJOSTEN.

The second annual convention of the American Electro-Platers' Society convened in the Convention City—Chicago—at 10 o'clock on June the fourth. The event makes a notable mark in the society's history, as thirteen of the fourteen branches in the society were represented by delegates or proxy.

The Chicago branch has done everything in its power to make the convention a success and to make the time spent in Chicago by the delegates from the various branches a time long to be remembered by all the visitors. The Chicago branch did itself proud in the complete and perfect manner in which its arrangements for conducting the convention and entertaining the delegates were made. President George B. Hogaboom also deserves a great deal of credit for the able manner in which he handled the convention and he made an admirable presiding officer. The Convention Committee was headed by S. E. Huenerfauth, ably assisted by Oscar E. Servis, president-elect of the Chicago branch.

The first day's session was called to order by President Hogaboom, who turned over the meeting during the morning to Mr. Oscar E. Servis. Mr. Servis spoke of the pleasure it gave the Chicago branch to have the honor of being hosts to the greatest gathering of electro-platers in the history of the industry. He then introduced J. H. Hansjosten, who delivered the address of welcome on behalf of the Chicago branch. President Hogaboom replied on behalf of the Supreme Society. The addresses of Messrs. Hansjosten and Hogaboom followed and the proceedings were then kept at the boiling point throughout the entire convention. Thomas B. Haddow, president of the New York branch, addressed the convention on behalf of this branch. He was followed by E. J. Musick, president of the St. Louis branch.

THE OFFICIAL BADGE.

The entire morning session was devoted to discussions on the progress made by the society during the past year, and the real work of the convention began at the afternoon session. Several important amendments to the constitution were offered and carried, notable among them being the one making the editor of the society's publications a member of the Executive Board. The remainder of the afternoon session was devoted to routine business. The evening session was devoted to the reading of papers and technical discussion, the titles of which were as follows:

"The Production of Silver Deposit Work," G. B. Hogaboom, Newark branch.

"To Pickle or Not to Pickle," J. H. Hansjosten, Chicago branch.

"Standardization," R. Davenport, Detroit branch.

"He Who Renders Service is Rewarded," L. Schmidt, Chicago branch.

The Friday morning session of the convention was called to order and presided over by Second Supreme Vice-President W. S. Barrows, of the Toronto branch, and was devoted entirely to routine business. At the afternoon session the supreme officers for the ensuing year were elected and Dayton, Ohio, was selected as the meeting place for the 1915 convention. The newly elected officers are as follows:

J. H. Hansjosten, supreme president; W. S. Barrows, first vice-president; H. H. Williams, second vice-president; Walter Fraine, secretary; J. E. Sterling, treasurer; H. E. Willmore, editor.

The Friday evening session was devoted to the program made by the Chicago convention committee, at which the following papers were read and discussed:

"Visiting A Modern Plant," J. Birnbaum., Milwaukee branch.

"Electro-Galvanizing," L. Schmidt, Chicago branch.

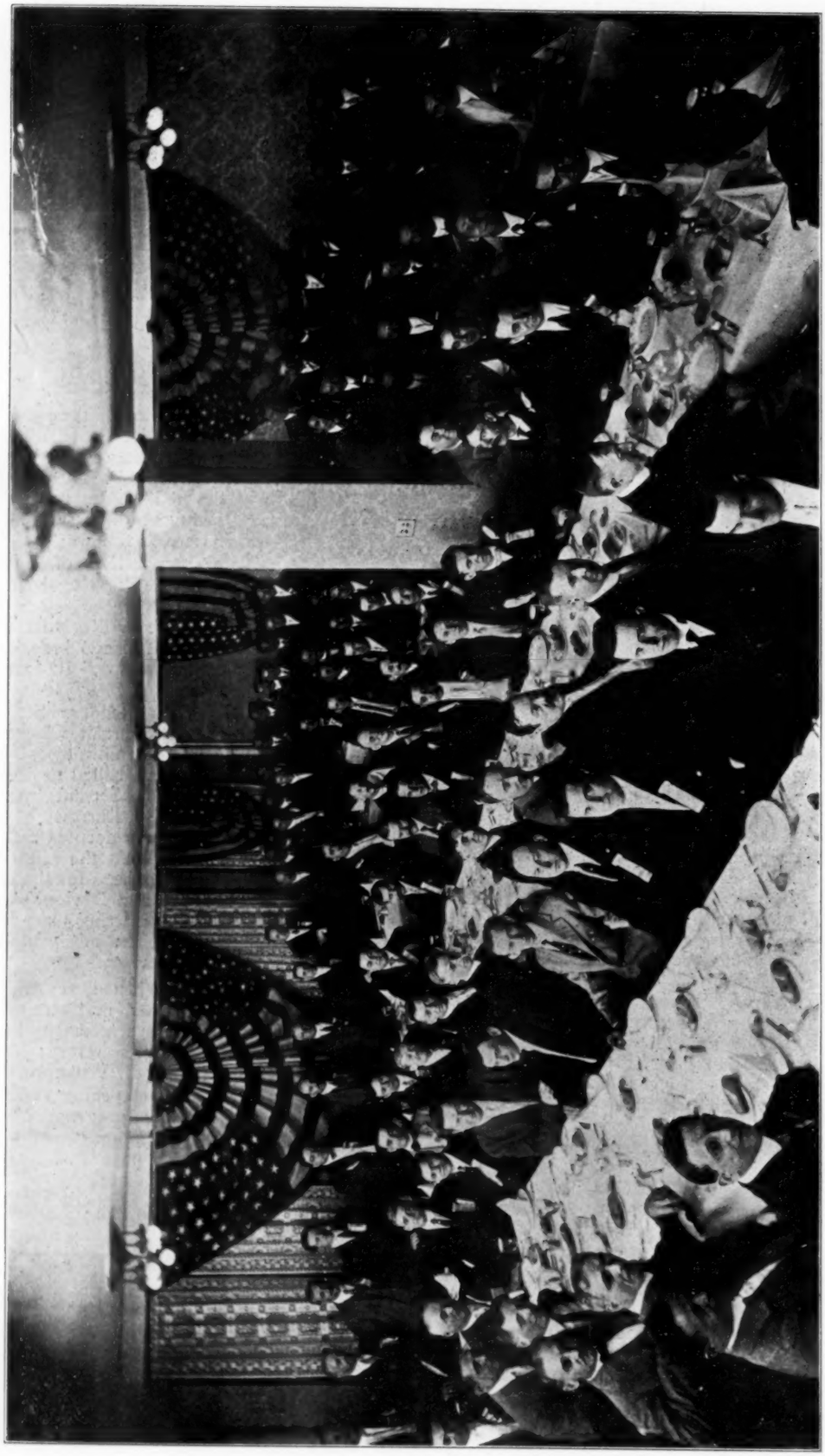
"Talk on Current Regulation," S. Huenerfauth, Chicago branch.

"Talk on Deposition of Lead," L. Schulte, Chicago branch.

"The Plater of Tomorrow," H. J. TerDoest, New York branch.

Saturday morning was devoted to visiting the plating plants by the delegates, who were divided into groups, each group being escorted by the members of

CHICAGO CONVENTION OF AMERICAN ELECTRO-PLATERS' SOCIETY



THE CLOSING EVENT OF A SUCCESSFUL MEETING. THE AMERICAN ELECTRO-PLATERS' SOCIETY AT THE BANQUET HELD SATURDAY EVENING, JUNE 6, 1914, AT HOTEL FORT DEARBORN, CHICAGO, ILL.

the Chicago branch. Saturday afternoon the delegates and visitors were taken for an automobile tour of the city, which was ably conducted by Mr. E. Lamoureaux, of the Convention Committee. On returning to the hotel, President Hogaboom called a special meeting to finish the reading of the supreme secretary's report. The following were also elected to honorary members in the Supreme Society: Charles H. Proctor, Dr. E. S. Smith, of the University of Pennsylvania; Dr. Oliver P. Watts, University of Wisconsin; W. L. Miller, of the University of Toronto, Prof. C. F. Burgess, Prof. Jos. W. Richards, of Lehigh University, and Dr. Bancroft, of Cornell University. There was also elected at the Saturday afternoon session a committee to shape the constitution as follows: J. E. Sterling, Thomas Haddow and Horace H. Smith, who are also to act as the auditing committee. Immediately following the luncheon on Saturday evening, the founder of the society, Mr. Chas. H. Proctor, installed the newly elected officers, which was followed by reading papers.

The program of the Saturday evening banquet and smoker was as follows: Overture, "Poet and Peasant," Suppé, Fisher orchestra; Address, Col. J. H. Hansjosten, Chicago branch; Song, selected, Whittier Quartette; Future Possibilities, Herbert J. Hawkins, Detroit branch; Magic Wonders, F. C. Cyrex; Songs and Stories, H. De Joannis, Bridgeport branch; What We Know About Electro-Plating, George B. Hogaboom, Newark branch; Song, selected, Whittier Quartette; "Humoresque," Dvorak, Fisher orchestra; A Plater's Best Assets, Col. J. H. Hansjosten, Chicago branch; Good Fellowship, Charles H. Proctor, New York branch.

One of the things which attracted considerable attention and favorable comments was the beautiful samples which were exhibited by the members of the society.

Taken altogether the convention was the most successful ever held by the A. E. P. S. and will long stand in the annals of the society as an event of great importance and profit to all who attended it.

During the several sessions of the convention souvenirs were distributed by various firms, of which the following were most prominent: Celluloid Zapon Company, New York, by F. P. Davis, a fancy pencil. Roessler and Hasslacher Chemical Company, New York, cigars, while the J. B. Ford Company, of Wyandotte, Mich., through Mr. McDermid furnished the "Wyandotte" many colored feathers with burdock burr ends that were so much in evidence.

It has been suggested that there should be a fifteenth branch of the society, and that Cleveland, Ohio, the "Sixth City," should be its home. Any foremen platers who are interested in this matter should correspond with H. J. Ter Doest, Bower street, Akron, Ohio, who has the matter in hand and will set things in motion.

The retiring officers of the American Electro-Platers' Society are as follows:

Supreme President, Geo. B. Hogaboom, New York branch; Supreme 1st Vice-President, J. H. Hansjosten, Chicago branch; Supreme 2nd Vice-President, W. S. Barrows, Toronto branch; Supreme Secretary, F. C. Clement, Philadelphia branch; Supreme Treasurer, J. L. Schultz, Detroit branch; Editor, S. R. Taylor, Newark branch.

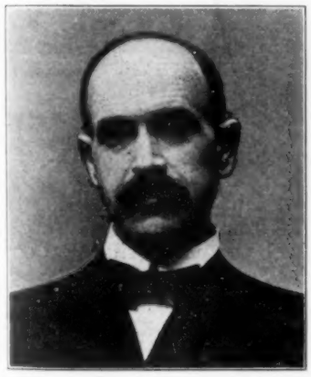
OLD AND NEW OFFICERS OF THE AMERICAN ELECTRO-PLATERS' SOCIETY.

COL. J. H. HANSJOSTEN,
(Chicago Branch),
President.

GEORGE B. HOGABOOM,
(New York Branch),
Past President.

WALTER FRAINE,
(Dayton Branch),
Secretary.

F. C. CLEMENT,
(Philadelphia Branch),
Past Secretary.



W. S. BARROWS,
(Toronto Branch),
1st Vice-President.

J. E. STERLING,
(New York Branch),
Treasurer.

J. L. SHULTE,
(Detroit Branch),
Past Treasurer.

H. H. WILLIAMS,
(St. Louis Branch),
2d Vice-President.

THE CHICAGO CONVENTION AS SEEN BY AN EASTERN PLATER

By Charles H. Proctor, Founder of the Society.

The second annual convention of the American Electro-Platers' Society, held in Chicago June 4, 5 and 6, has passed into history and will be remembered by all those present as the most successful meeting of the society ever held. The Chicago branch has proved that the slogan of their great city has been inculcated in their efforts and the (I will) has permeated throughout their entire arrangements, and the committee in charge are entitled to the sincere thanks of every member of the society. In the business arbitrations of the sessions the delegates proved that their selection by the numerous branches were well chosen, and while their efforts were put forth in the interest of their respective branches, it is proved that by the harmony and good fellowship in their discussions upon the numerous amendments offered, that their work, as a whole, was for the welfare and upholding of the society. I feel extremely gratified in this spirit of harmony shown, and as I see the superstructure of the American Electro-Platers' Society raised to a higher level, growing to be an important factor in the lives of the American electro-platers, and realize that the corner stone was only laid a few short years ago, it proves what can be accomplished by co-operation and unity of purpose. As we look forward to the future, we are confident of greater efforts for the success of the society, and when the third annual convention occurs in the city of Dayton, Ohio, in 1915, I feel sure that through the untiring efforts of the new supreme officers the branches will be extended in numbers and the membership increased proportionately.

CHARLES H. PROCTOR.

As I look back to the convention hall and realize that after the heat of discussion came the calm, as after a storm, and heard the tender expressions of brotherly love prevailing, it proved that "one touch of nature makes the whole world kin," as our future Supreme President Colonel J. H. Hansjosten was nominated by the presiding officer, George B. Hogaboom, one touch of nature came forth, and in a beautiful oration he paid tribute to the sterling qualities of the man he proposed to guide the welfare and destiny of our society. The splendid token of appreciation was multiplied by the burst of enthusiasm shown by the entire delegation and others present. When the nomination was put forth, Mr. Hansjosten was so overcome by these tokens of good will and fellowship that for the moment he was unable to respond, but later, after his election, he rose equal to the occasion and in a burst of eloquence for which he is famous paid tribute to Mr. Hogaboom as retiring president and presented him with the gavel of Chicago branch that had been used by each preceding president.

At the luncheon on Friday at the Chicago Hardware Club, extended to the delegates and visitors, Mr. Starrett, of the Hanson & Van Winkle Company as toastmaster, paid a sterling tribute to the society for the work it had accomplished; responses were made by several present in behalf of the society, at the same time paying tribute to the good qualities of Mr. Starrett and the work he had accomplished as an associate member of the society. The luncheon came to an end with good fellowship prevailing. To the gentlemen of the newly extended supreme body I wish to extend my congratulations, knowing that their work will be untiring for the best interests of the society.

FIRST REPORT OF THE COMMITTEE ON THE NOMENCLATURE OF ALLOYS*

A committee to consider the whole question of the nomenclature of alloys, as raised in a paper, "A Note on the Nomenclature of Alloys," read by Dr. W. Rosenhain at the annual general meeting of the Institute of Metals, held in London on January 17, 1912, was appointed by resolution of the Council of the Institute of Metals on April 24, 1912. It was decided that the committee should consist of eight members appointed by the council as representing the Institute of Metals, and that the councils of allied societies and institutions should be invited to nominate representatives on the committee.

The committee having in the first instance confined their attention to the alloys of copper, the terms first defined on this basis are "brass" and "bronze." The definitions recommended and adopted by the committee are as follows:

BRASS.

The term "brass" is to be used as an abbreviation of the words "zinc-copper" as employed in the systematic nomenclature. Thus when the word "brass" alone is employed it shall denote an alloy of zinc and copper only, containing more copper than zinc, i. e., containing over 50 per cent. of copper. When an alloy containing a third metal, such as tin, is to be denoted, the name of the additional element shall be used as a prefix, precisely as in the systematic nomenclature. Thus an alloy containing tin 1 per cent., zinc 29 per cent., and copper 70 per cent., would be called "tin-brass." If additional metals are present their names may also be prefixed, or the general prefix "comp." or "complex" may be used if it is not essential to mention the other elements specifically.

BRONZE.

The term "bronze" is to be used as an abbreviation of the words "tin-copper" as employed in the systematic nomenclature. Thus when the word "bronze" alone is employed it shall denote an alloy of tin and copper only, containing more copper than tin, i. e., containing more than 50 per cent. of copper. The presence of one or more additional metals shall be denoted in the same manner as has been indicated above in the case of "brass."

The committee is not prepared at the present stage of its work to recommend definitions of any further practical terms, as further consideration is required for the framing of definitions relating to smaller and more strictly limited classes of alloys.

*Presented at annual meeting of Institute of Metals, held March 17, 1914, at Westminster, London S.W.

BUYING AND SELLING BRASS FOUNDRY SCRAP

SOME ADVICE FOR THE UNWARY TO FOLLOW IN ORDER TO ESCAPE "SLICK DEALS."

BY W. H. PARRY.*

In dealing with the merchants, or, as they prefer to be called, "Scrap Dealers," in the metals usually used in brass foundries, it behooves the owners thereof to be on the constant lookout, or some pretty raw deals will be slipped over on them that will prove at least why they prefer to be called "scrap dealers." If there is any one trick that these dealers do not know of I have yet to hear of it. As a warning to those of a trustful nature who are inclined to believe that everybody is honest until proven guilty, I propose to jot down here a few experiences that will change their opinion some so that they will join that "wise guy" class that believes everybody is dishonest until proven guiltless.

Some few years ago there was bought one lot of fifty thousand pounds of scrap copper, supposed to be of a very high grade. What there was of it was fairly good and had the concern who purchased the metal been easy, the dealer might have put one across that would have put to shame any Wall Street shark in his dealings with the greenest lamb, that ever had designs to gather the very easy kale found in that strictly "honest" locality. The stuff was delivered in casks of the hogshead variety and the tare was painted on each with white paint and in very large characters, with the evident intent of showing the customers that deception was not their middle name. There being no immediate necessity for opening the casks, they stored them in a room outside of the foundry proper where the temperature in winter was all it was outside and then some.

After a few days in cold storage, some copper was needed by the melter, and he armed himself with a pinch bar, axe and hammer and such other light dental tools used in the profession. He was rather surprised to find that all the casks were open and had been for some time, as every cask in the lot had been burst to pieces from the frost. You will say how could cold weather affect the copper in such a way that each and every cask was open? Patience, dear reader, patience, for I have forgotten to record that every cask had been filled with water by the scrap metal dealer. That is, there was some copper in them, but as water is a whole lot cheaper than even scrap copper, he figured to get away with the deal by being in collusion with somebody. He might have got away with it at that but for the honesty of the melter, who reported the matter, more through a dislike for hewing ice to get at the copper than from any great desire to shine as a simon-pure, honest man.

The dealer was notified to take the mixture of casks, copper and ice away, and when called upon to explain the matter, blandly told the good people that as most of the copper had been covered with insulation, it had been burned off and the wire had been placed in the casks very hot. In order to avoid the kindling of fire in them they had sprinkled a little water on the copper to cool it off. On closer examination a very liberal amount of oakum was found clinging to the top and bottom heads, and it was inferred that it was used to calk the heads so that they would hold a lot more than a mere sprinkling of water. It was estimated that at least one quarter of the net weight was aqua pura.

The next time this dealer supplied the same concern with copper he was instructed to deliver it in bales. He did, and they were some bales, averaging a thousand pounds to the bale and most of which was copper plated steel wire with a sprinkling of fine wire. In fact, the wire was so fine that the shrinkage in melting it in a Schwartz furnace was so great that Andy Carnegie would go broke using it if he paid more than three cents a pound for the stuff. You can imagine what happened when they tried to melt the copper-plated steel wire in a furnace that was gaited to melt brass only. As the melting point of steel is so much above that of brass the inevitable consequence was a lot of annealed steel wire covered with the ashes of copper, and well balled up at that. This happening almost drove the scrap dealer into the madhouse, as he claimed that he had sold the metal in good faith, having bought it as copper. It was found a little later that in his storage plant he had successfully operated an electric plating outfit, and it was suspected that his knowledge of how the wire became copper plated had some depth.

Another concern, and a big purchaser of metals, had grown careless in its scrutiny of the means employed by the scrap dealers in delivering scrap copper to their foundry. They only woke up when the ale casks that were used as containers were found to have staves three inches thick and heads five inches thick. As the average tare to be subtracted for this class of casks was about eighty pounds, and while they actually weighed over two hundred pounds, it does not need anybody with an over bright mind to figure a loss of one hundred and twenty pounds to the cask. There were fifty of these casks in the lot, and six thousand pounds would not be a bad guess for the amount that the dealer had figured on getting away with. In this particular instance the dealer was caught with the goods on him and came very near wearing a striped suit for a few winters up the river.

In selling materials to this gentry, eternal watchfulness is as absolutely necessary as in buying from them. While the foundry residues are not as valuable per pound as the stuff bought, yet the Heathen Chinese of Bret Harte's certainly had nothing on metal dealers for "tricks that are vain." The twenty-four packs of cards that the chink used in defrauding the two miners out of their hard dug gold was only a flea bite compared with the stacked cards used by dealers when buying or selling.

One of the biggest dealers in this part of the country is the owner of an immensely large St. Bernard dog weighing in the neighborhood of one hundred and fifty pounds. This animal is so well trained that if his boss is selling materials he just loves to be weighed in with the load. He also has a strange antipathy to weighing out, but let his boss be the buyer, he then insists on being weighed as part of the empty truck, that is, to convey the materials outside the premises, but never as part of the truck gear when the load leaves. This dog has earned his weight in diamonds is the belief of many good people in Brooklyn, N. Y., and the citizens of that town "point with pride" to this dog as an example of what can be accomplished if one will live in Brooklyn long enough to be trained properly.

The old dodge of weighing the driver plus a couple of well weighted feed bags has no place or standing

*Superintendent, National Meter Company, Brooklyn, N. Y.

here because of its being so well known. Although when they ring in a heavy cast iron plate about three inches thick that just fits in the driver's seat well covered with a couple of blankets it is about time to sit up and take notice. More particularly when several such plates are found on your premises after the junk dealer is through. You will then realize that there is a considerable difference in price between what he paid for the cast iron plates and the residues he was hauling out from your place. In manipulating the weighing scales you will find that the dealers are not lacking in skill, and the stunts they can pull off on you are well worthy of close study.

On one occasion it was decided not to trust the truck scales, as the balancing weight as the short end of the beam was too accessible to the nimble fingers of the dealer while leaning in a most nonchalant manner against the uprights. A platform scale was used to weigh the stuff by the single barrel. Everything went along smoothly, and the dealer came pretty near putting one more across, but as his greed was greater than his discretion, he had during the absence of the weighmaster for but a few minutes, caused the breakage of the outboard frame of the platform. By placing the barrels a little off center and towards this broken end any old weight would register, but always less than the correct amount, as he happened to be buying that day. The barrels were then placed on the truck scales in batches of twelve, and the difference in the weights was something fierce. So much so in fact that the dealer put up a howl that could almost be heard in Jerusalem, when it was made evident that he had been hoist by his own petard.

Mention has been made here of a highly trained dog, and I had about forgotten to warn THE METAL INDUSTRY readers that in the employ of many dealers they have specially trained truck drivers. These drivers are so well versed in hewing close to the line of honesty that in driving on the scales when they are selling goods they can hit the center of the scales without any trouble. With equal ease when they are buying they can place one of the truck wheels so that half of its width, at least, is not on the scales. You may well believe that as sharpshooters these drivers ought to be able to hit the bull's eye twenty-three times out of a possible twenty. Of course there are many honest metal dealers who make a specialty of scrap metals, but the main trouble with this class of dealers being that they die young and in agony at the thought of what might have been. In so doing discouraging other dealers who start out in their early life as such and with the best of intentions and who usually wind up in jail. If they have been both thrifty and lucky they become plutocrats who rave at dishonest politicians and grafters, the latter particularly, as it was once their own cherished profession.

SECONDARY METALS FOR 1913

A REPORT OF THE METALS RECOVERED FROM MATERIAL NOMINALLY CALLED "WASTE."

The value of the "secondary metals," exclusive of gold, silver, platinum and iron, recovered in the United States in 1913, was $72,845,000, according to J. P. Dunlop, of the United States Geological Survey. Even this large figure is a decrease compared with 1912, when the value was $77,396,000.

"Secondary metals" are those recovered from scrap metal, sweepings, skimmings, drosses, etc., and are so called to distinguish them from the metals derived from ore, which are termed "primary metals." The distinction does not imply that secondary metals are of inferior quality. It is impracticable to segregate the statistics relating to the refining, remelting and re-use of secondary metals according to States, but over 90 per cent. of the refining and smelting of drosses and scrap metals in the United States is confined to the territory east of St. Louis and north of Ohio river.

NEARLY 140,000 TONS OF COPPER RECOVERED.

The total amount of secondary copper recovered in 1913, on the assumption that the brass remelted had an average copper content of 70 per cent., was 136,500 tons, of which 18,661 tons (about 4,000 tons more than in 1912) was recovered by plants refining primary metals and the remainder by plants treating only secondary materials. The copper produced by smelters of the latter class includes 36,716 tons of pig copper, 11,603 tons of copper in alloys other than brass, and 69,520 tons of copper in remelted brass. These figures indicate a decrease for 1913 of about 6,000 tons of pig copper and 1,500 tons of copper in brass, and an increase of about 2,300 tons in alloys other than brass. At least 45,000 tons was recovered from clean scrap made in the course of manufacture of copper and brass ware, so that only about 91,500 tons was obtained from ashes, cinders and scrap, or from material that had actually been used and discarded. The production of copper from secondary sources in 1913 was equal to about 17 per cent. of the refinery output of primary copper in the United States from all sources, or about 22.4 per cent. of the primary copper smelted from domestic ore.

PRODUCTION OF SECONDARY METALS IN THE UNITED STATES IN 1912 AND 1913.

	1912		1913	
Metal.	Short tons.	Value.	Short tons.	Value.
Secondary copper, including that in alloys other than brass	66,441	$21,593,325	66,980	$20,536,068
Remelted brass	101,523	27,279,516	99,315	24,651,969
Secondary lead	30,266	6,045,120	33,104	6,409,392
Recovered lead in alloys	36,902		39,730	
Secondary spelter	32,251	7,750,494	50,005	6,019,776
Recovered zinc in alloys other than brass	3,912		3,743	
Secondary tin	8,333	14,301,368	6,415	12,567,379
Recovered tin in alloys	7,068		7,763	
Secondary antimony	13	426,020	45	460,932
Recovered antimony in alloys	2,493		2,660	
Secondary aluminum	....	.....	2,198	2,199,480
Recovered aluminum in alloys	....	.....	2,456	
Total value		$77,395,843		$72,844,996

SMALL DECREASE IN SECONDARY SPELTER.

The output of secondary zinc (including that in brass) amounted to 79,570 tons and equalled 23 per cent. of the production of primary spelter in the United States in 1913, compared with 24.1 per cent. in 1912. The zinc recovered in alloys other than brass amounted to 3,743 tons, compared with 3,912 tons in 1912. Of the 50,005 tons of secondary zinc recovered as spelter, 25,991 tons were obtained by redistillation from drosses, skimmings, etc. In addition to the large quantity of spelter recovered, it is estimated that over 15,000 tons of zinc chloride was made from drosses, skimmings, etc., and likewise several thousand tons of the zinc pigment lithopone.

THE ART OF METAL SPINNING

THE SPINNING OR FORMING OF METALS TOGETHER WITH THE TYPE OF TOOLS, CHUCKS AND LATHE REQUIRED TO PRODUCE THE ARTICLES FROM THE METAL BLANKS.

BY EASY WAY.

(Continued from April.)

The tools called planishers are next in importance, and ⅝ inch octagon steel is used and finished to form them (see Fig. 4). It is quite necessary that the end should be straight with reference to the width of tool and nearly rounded with reference to its thickness, and special care should be taken to have the two flat tapering surfaces true and as smooth as possible. All that portion of the steel which has been forged should be ground and, after hardening, polished as its principal use is that of a burnisher, therefore, it is purely and simply a finishing tool. The flat surfaces at its opposite the flats is used very often and should be finished and hardened. When completed this composes a very efficient tool.

The grover tool (see Fig. 4) derives its name from producing grooves and used for and almost entirely in spindle forms. It will be noticed by the cross section shown that small grooves of varying sizes may be produced by simply using the tool in contact with the metal at different points on the curve of the tool and manipulated by placing it on top of the tool rest with its end hanging down and forcing down on its handle,

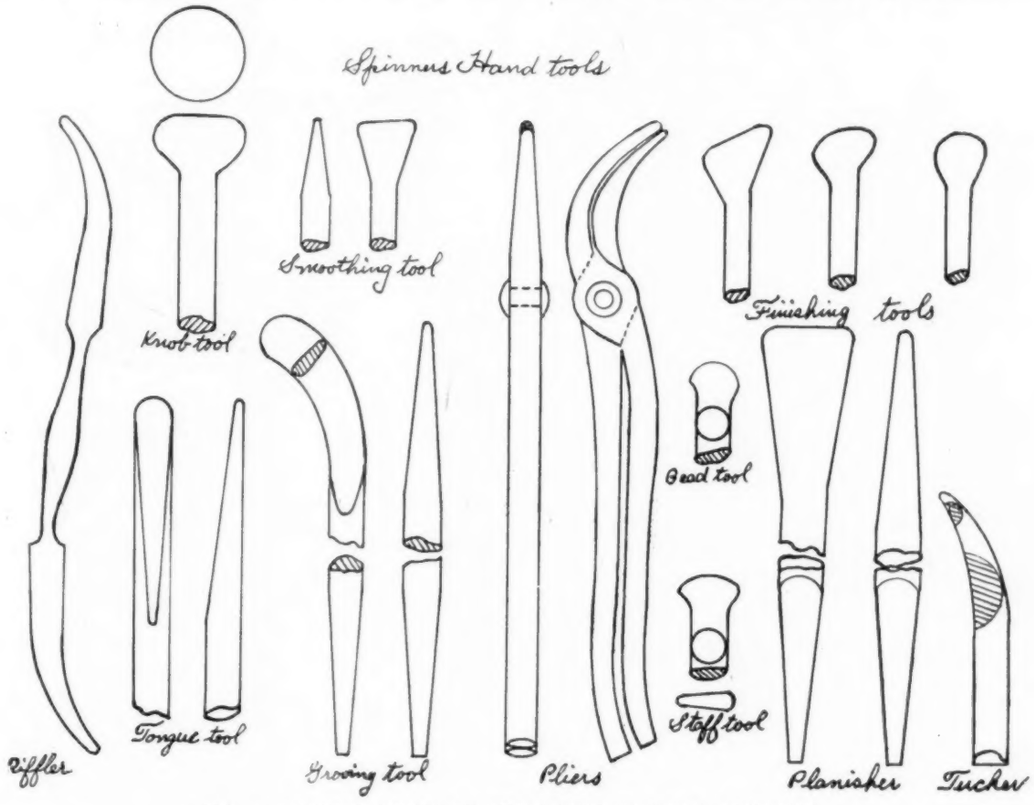


FIG. 4. VARIOUS FORMS OF TOOLS USED IN METAL SPINNING.

end are used when perfecting small grooves by pushing it into the concavity as if it were a cutting-off tool in wood.

Tongue tools, which are commonly known as turning-over tools (see Fig. 4), are quite different in their formation and are used principally when forming convex surfaces from which it derives the phrase by the craftsmen as the "turning-over tool" and is usually made of ½ inch round steel, otherwise this tool resembles the planisher. The planisher is very often used in its stead when large convex surfaces are spun. The tongue tool can be produced from the steel rod by grinding, as it is not necessary to forge the tongue, but care should be taken that the flats are ground without burning the steel, as these are the part of the tool which are principally used. The cylindrical part thus making a lever of the tool with the tool rest as the fulcrum.

The knob tool commonly known as the knob raiser may be used for raising up or hooking under the metal, as when spinning a dish concave towards the lathe head. It is also made use of by pressing it endwise toward the center line of the lathe to form a concavity on a spindle. These tools are forged and given the desired shape, then ground, hardened and polished.

The foregoing list are the tools found generally in the spinner's kit and might conclude the list of those necessary in common spinning, but for the extraordinary or unusual shapes spun peculiar and special shape tools are required and made as the occasion demands.

The handles and method of fastening the tools in

them is very essential for safety sake and are shown in Figs. 3 and 4. The wood usually used is straight-grained, hard maple and are made from 12 to 15 inches long and the tool driven into it from 4 to 5 inches. The ferrules that support the wood around the tool is produced from malleable casting, heavy brass tube or iron pipe. The tool and handle, when combined, are from 24 to 30 inches long to permit the end of the handle to rest under the arm and thus aid the operator to get a powerful leverage by throwing the weight of his body on it. The spinner's beading tool besides the spinning tools proper is shaped like a pair of pliers (see Fig. 4), but differ from the regular pliers as its insides and edges of the jaws are rounded and made perfectly smooth that the metal may not be torn.

To preserve the finished parts of all the tools care should be taken that rust does not accumulate on the polished surfaces, as the smoother and brighter the tools the easier and better is the work produced by them. To keep the tools in order and preserve the

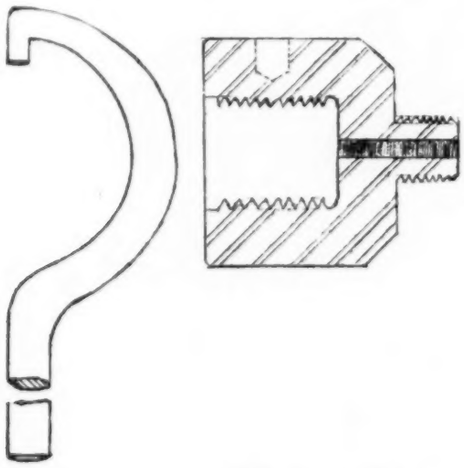


FIG. 5. A REDUCING NOZZLE FOR LATHE HEAD.

good qualities a piece of thick sole leather about 8 x 6 inches fastened on a strip of wood with the hair side down and on this some putty powder sprinkled will polish their working surfaces. The tool should be cleaned from all oil and its end rubbed to and fro rapidly to get a high polish and after a time grooves will be worked into the leather, each fitting its particular tool.

The other loose tools of the craftsman are wood-turners, gauges and chisels, an inside chaser for the spindle nose, when blocks are not fastened to the face plate a small pair of screwing tools for building up models when of unusual height, a small metal pot for oil with which to lubricate the revolving metal, calipers, a square, a straight edge and a pair of compasses, also an oil stone inserted in a wood block with a lid or cover. Then if an assortment of seasoned red beech or other hard wood blocks, squared and cornered for the different shape forms are in readiness, the art of spinning can be accomplished by practice which becomes very interesting and an art that one should be proud to master.

To assist the reader and form an idea first in elementary spinning as to the means employed to form, force and press the metal blanks into their respective shapes a few sectional, perspective and conventional designs and illustrations will be submitted. These may not be shown to scale measurement due to want of space but a very plain and every day practice plan will be kept in mind that all may readily and thoroughly understand the several operations in a practical and precise manner. The preliminary spinnings are generally accomplished on wood chuck and forms that are roughly turned to shape but the final operations are always finished on a chuck accurately turned to a model or template. Either wood or metal can be used for these forms and chucks, but wood should always be used to start with because spun articles are not frequently finished in one operation as annealing of the metal is necessary and often times more than once before the article is finished. Any odd bit of hard wood, if large enough to produce the shape, will serve and very often when a chuck has worn or done service for an article it may be changed to a shape to suit another. The red beech referred to for chucks is common and cheap, but for a better wood chuck well seasoned hornbeam is far superior for large work. Many think well of lignum-vitae wood because of its staying qualities, but well seasoned boxwood is very often chosen by the spinner as this wood does not shrink materially and

AN EXAMPLE OF PRACTICAL METAL SPINNING. A TYMPANUM, OR KETTLEDRUM, MADE BY JOHN J. POLE, OF GENEVA, N. Y.

is easily turned, yet remains hard and also can be finished very smooth. When small articles are made a reducing nozzle to fit the nose of the lathe head is convenient to facilitate large pieces of wood or metal for the chucks. These may be of a casting or steel and together with a key made from steel by the aid of which the nozzle can be tightened or removed on the lathe nose (see Fig. 5). The projecting end of the nozzle to receive the several formed chucks is threaded with an inside and outside thread which makes it a very good tool adapted for most any style of chuck, male or female.

Metals used for shallow spinning are zinc and aluminum where generally not more than a stamping process is required, where silver is commonly hammered but copper and its alloys by being kept perfectly pliable can be produced in most any known shape and in one piece when the chucks are so constructed that the article may be removed when finished, of which specimen sketches will be shown later in the article. Constant friction between the tool and the blank tends to harden the metal, hence it becomes necessary to anneal and keep the metal soft many times during the time of producing the finished article. Copper is the easiest metal to spin, because it is pliable and can be annealed readily when it becomes hard.

(To be continued.)

"FOUNDRY SANDS AND THEIR TREATMENT"*

SOME INSTRUCTION IN THE MICROSCOPICAL EXAMINATION AND TESTING OF THESE MATERIALS.

BY ALGERNON LEWIN CURTIS.

One of the most vital points concerning present-day foundry practice is the question of moulding materials and their treatment, which until quite recently has lacked the attention it should have demanded.

Some founders endeavor to estimate and gauge the amount of new moulding sand used per ton of metal actually melted in the cupola, then pride themselves upon statistical results. Such figures, however, can hardly be admitted commercially on account of the greatly varying conditions of the foundries themselves. When it is stated that the mean efficiency of a ton of moulding sand used varies from 4 tons of castings to 20, the difficulty of affecting comparisons can be more readily understood. Also in order that such figures may be of much value to the foundry community generally, the factor of price (which includes transport of sand) must be taken into consideration, together with details of cost of removing old sand from the foundry floor.

The study of moulding meterials and their treatment necessarily embraces a number of very important subjects, viz.: geology and petrology, chemistry, metallurgy and mineralogy, heat and pyrometry, microscopy, physics and foundry practice.

By geology, petrology and mineralogy the mineral characteristics of moulding materials can be discovered, through the aid of chemistry, heat and microscopy, while a knowledge of ceramics, physics, metallurgy and foundry practice enables the behavior of sands, compositions, clays and metals under heat and in solution to be better observed.

There is little doubt that much "moulding sand" like nearly all other sands was originally deposited under water, and the main constituent would therefore be quartz with varying quantities of other minerals. The chief principles of sedimentation are those of running water in streams or currents along seashores, which transport and deposit such sands, and during the process a sorting action takes place according to the specific gravity and size of the different particles, in which large grains of light minerals become amalgamated with smaller grains of heavier minerals. Sand particles during such transportation become more or less rounded, due probably to mutual abrasion, as the larger the grain the more pronounced is the rounding. With equal-sized grains the heaviest are the most rounded. Water, however, is not the only factor in transporting and depositing moulding sands, as in certain countries wind has been responsible for large deposits, these latter being made up of finer materials than sedimentary deposits, owing to greater abrasion taking place in air than in water.

Most authorities agree than sands can be classified into three groups, viz.:

A. Sands derived by assortment of glacial drift material, water and wind currents.

B. Sands derived from the weathering of sandstones and other rock, usually termed residuary sands.

C. Old sandstone formation or rock sands, which cover large areas, usually being cemented by oxides of iron, etc.

In order to examine the mineral content of any moulding material, composition or sand mixture, the microscope must be used, but before the significance of such an examination can be made apparent, a complete set of the minerals met with in moulding materials should be mounted and learned. It is quite possible to distinguish the minerals contained in a moulding sand by the aid of a microscope, which should be fitted with polarizing prisms, concentric and mechanical stages, the latter being detachable. The instrument best adapted for this work and which the author uses in his own laboratory is a petrological microscope made by Wm. Watson & Sons, Ltd., 313, High Holborn, London. Objectives by the same maker of 1 inch, ½ inch and ¼ inch will be found the most suitable size for making examinations.

Next to the instrument and objectives, perhaps the question of illumination is the most important part in a microscopic examination of moulding materials. For dark ground illumination (which is essential) the extra power of an incandescent gas light is preferable to an oil lamp, as its white color is very welcome, and the image can be made most brilliant, even if the object be somewhat dense. A finely ground glass in front to break down the mesh of mantle, then a pale cobalt glass in front of this will whiten the light considerably, making it as near daylight as possible. Both these glasses are slipped in the chimney.

Other microscopic requirements should include a comera specially fitted to the instrument, suitable mounting materials and apparatus, which include bottles of fluids of heavy liquids of known specific gravity, a separating funnel, and one or two beakers. The points to be considered in the identification of a mineral are: its colour and pleochroism, refractive index, behaviour under crossed nicols and specific gravity. Colour and pleochroism can be seen by inspection, the refractive index is found by immersing grains in a fluid of known R.I. and then under the microscope, by the Schroeder van der Kolk method, finding whether the R.I. of the grain is higher or lower than that of the liquid. A special set of liquids with refractive index varying between 1.447 to 1.83 are prepared by Dr. F. Krantz Bonn, Germany. Under crossed nicols it will be seen whether the mineral grain is isotropic or not, whether its extinction is straight or at what angle it is inclined. Specific gravity is found by putting the grains into a heavy liquid in the separating funnel, when those grains with a heavier specific gravity than the liquid will fall to the bottom. The minerals in moulding sands which it is incumbent for the foundryman to recognize under the microscope can be grouped as follows: quartz, felspar, amphibole, pyroxene, mica, tourmaline, apatite, zircon, rutile, garnet, corundum, magnetite, chlorite, serpentine, haematite, pyrite, kaolinite, sillimanite, calcite and dolomite, monazite, titanite, epidote, spinel.

Familiarity with specimens of these minerals under the microscope will enable founders to more readily diagnose their moulding sands, thus controlling the refractory bases of such materials at will. Following closely on to the identification of minerals in a moulding sand by the aid of the microscope, is a suitable method for everyday use in the foundry to quickly analyse any given sample of sand. Except in certain cases an accurate ultimate analysis is not necessary for everyday foundry practice, because ultimate results are better and more quickly checked by the oxy-coal gas or oxy-acetylene blow pipe with a Fèry absorption pyrometer. To analyse a sample of moulding sand (which should be taken from all parts of the heap or bin, and be thoroughly mixed to get uniformity) first dry the sample one hour at 100° Cent. to expel the hygroscopic water, then gently rub in a mortar, finally sieving same through a 30 sieve, any lumps being retained or the sieve to be again rubbed in mortar until they all pass through the sieve. Weigh

*A resume of a paper read at the Association Technique de Fonderie's recent congress in Paris.

out one gramme of material and moisten same with 5 c.c. water, then add 15 c.c. H_2SO_4 at 1.84 S.G. Keep the mixture well stirred, covering beaker with a watch glass. Digest on a hot plate for twelve hours at a temperature high enough to make the acid fume. Remove the beaker containing sample, allow it to cool, then dilute with 100 c.c. cold water. Stir thoroughly, bring to a boil and filter through a close filter, using No. 589 blue ribbon, then wash well with hot water. Discard the filtrate and replace paper and residue in the beaker, digesting with 100 c.c. of 10 per cent. NaOH solution for 30 minutes at boiling temperature. Filter again through a close filter, washing by decantation three times with a 1 per cent. NaOH solution, leaving the bulk of the filter paper and residue in the beaker. To this add 50 c.c. hot 1 to 3 HCL solution, stir thoroughly, then continue the filtration and transfer the contents of the beaker to filter. Keep on washing with hot water until the washings are free from chlorides. Burn the residue wet in a weighed platinum crucible and ignite to constant weight. The weight obtained is the weight of the quartz plus felspar. This weight subtracted from 1 gramme gives the weight of the clay substance in the sample. Fuse this quartz-plus-felspar residue with five times its weight of Na_2Co_3 in the platinum crucible and determine the alumina present. This is the alumina of the felspar. Calculate the weight of the felspar, subtract it from the weight of the quartz-plus-felspar and obtain the weight of the quartz. Felspar $Al_2O_3K_2O$, $6S_1O_4 = 18.34$ per cent. Al_2O_3. To obtain the approximate ultimate analysis of the sand, instead of discarding this filtrate containing the sulphuric acid solution of the iron and alumina of the clay substance, oxidise it with bromine, precipitate the iron and alumina with ammonia, and determine their respective weights, using these two additional results together with the analysis and the formulæ given below to calculate the ultimate composition. Total silica equals the per cent. quartz plus 64.74 per cent. felspar plus 46.51 per cent. (clay substance minus iron oxide). Total alumina equals the alumina of the clay substance plus the alumina of the felspar. Total iron oxide equals the iron oxide of the clay substance. Total alkali equals 16.9 per cent. of the felspar. A rather important test for determining the mean fineness of a moulding sand showing percentages of different sized grains is effected by the Scott method, which is rather too long to give here in detail. It will suffice to state that the sand is sieved in different sized sieves and the weights of sand retained on each sieve averaged out.

The next most important point in the testing of moulding material is the determination of its refractory qualities. This is best done with an oxy-coal gas or oxy-acetylene blow pipe, using Seger cores, and Fèry absorption and stereo pyrometers. In certain cases the oxygen furnace is specially adapted for such tests. When using an oxy-coal gas blow-pipe the oxygen cylinder should be fitted with an automatic regulator and shoulder tops, the blow pipe being of a suitable design having different sized platinum lined nozzles. Specimens of moulding sands clays, compositions, or sand mixtures should be of a size to comfortably lie on a 3 x 1 microscopic glass slide, 2¾" x ¾" x ¼" being a convenient size to use. It is sometimes necessary to test for warping or shrinkage and for this purpose a tapered mould is substituted for one of flat section. Cube moulds are also useful when testing materials in either a muffle or oxygen furnace. An automatic traveling rest is recommended for traveling the specimen under flame of blow-pipe, the latter being fixed so as to distribute the heat over surface of specimen, and give the operator a better opportunity to watch what is taking place. For ordinary purposes it is best to use six specimens from 1200° Cent. to 1700° Cent., taking microphotographs of each specimen when tested. This will show the refractory quality of such material, but when testing sands for casting steel it is best to use small moulds as well, made up of the material being tested, and pour them from crucibles. For this purpose the oxygen furnace made by Fletcher Russell & Co., Ltd., of Warrington, will be found most useful. All specimens for either blow-pipe or furnace should be dried one hour at 100° Cent., or same may be blown away by the fierceness of the pipe. The best heat recording instrument to use for blow-pipe tests is the Fèry absorption pyrometer, made by the Cambridge Scientific Instrument Company, Ltd.

A very important point in connection with moulds is the testing of density or pressure a sand may be rammed in any given mould. In order to determine such densities or pressures the author found it necessary to devise a special instrument which is portable and light, can easily be manipulated, and records the pressure at which sand in a mould is rammed, in lb. per sq. in. up to 56 lb. per inch of penetration. It is operated by simply pushing same down into a mould, and reading pressure and depth of penetration from the graduated scales. A good method of testing the porosity of a sand mixture by this instrument is to compress a cubic inch of sand in a cylinder whose area approximates an inch in area to the desired density, then attach cylinder to a vessel containing compressed oxygen, the latter fitted with a pressure regulating device. If the sand is too fat or rammed too hard, it will take a bigger pressure of oxygen to force its way through the sand than if the latter is more open and not rammed so hard.

In artificial sand mixtures, especially where the treating of old sand with plastic fire clay is concerned, some means for measuring the plastic value of a refractory clay becomes necessary, as the cohesive or workable value of any sand mixture or composition depends largely upon the plastic value of its clay substance, other things being equal. For this purpose the author designed an apparatus for ascertaining the relative plastic value of any clay substance. In order to better illustrate the need of such apparatus, suppose two clays are submitted for examination, both possessing the same approximate analyses and refractory qualities. It will be found by the use of such apparatus that perhaps one clay possesses a plastic tensile strength of 9 lb. per sq. in., the other only 3½ lb. per sq. in., equal quantities of water being used. It is therefore obvious that the higher the plastic tensile strength of a sands clay substance, the greater will be the cohesive or workable value of the sand mixture.

Next to the study of moulding materials comes their treatment, and it would be difficult to find many general engineering concerns who do not claim to be able to build special sand treating machinery. It is obvious that before any definite conclusions can be arrived at in establishing the design of such machinery an expert examination must be made of the materials desired to be treated. This is somewhat outside the jurisdiction of the general engineer. By making the proper use of such an examination, however, it is possible to arrive at a design for machinery which will give results that are most profitable. There are some founders who use no machinery at all for mixing or testing their sands, and it might be pointed out for their benefit that they can, by installing a suitable plant, defray its cost in a few years, besides increase the standard of their castings.

The majority of founders who use machinery probably use the pan mill either wet or dry. Those who have discarded such machinery on account of its grinding action employ sand mixers, concrete mixers and spinners or spreaders, but a few have installed special plants designed for the purpose. There are three sound reasons why founders should instal special sand treating machinery. These are: First, to save labour; second, to save new sand, coal dust compounds, wet and dry; also to save the expense of removing old sand from the foundry floor, which can be used again; third, to guarantee a homogeneous and uniform sand mixture or composition which can be duplicated from day to day without variation in ingredients, moisture or strength. As far as the labour saving propensities of the pan mill, the concrete mixeer or spinner are concerned, it must not be forgotten that sand has to be wheeled to and from the machinery, besides being shoveled in and shoveled out, making it necessary to handle the sand several times. Another great objection to such machinery is that it has no means of correctly proportioning the ingredients used. This latter is very important, as one of the great troubles the founder has to contend with is the duplicating of a given sand mixture or composition (in ingredients, strength and moisture) from day to day. With regard to the pan mill, this machine's functions are to grind, and dust or crushed particles of silica or felspar are the result of such grinding action. Sand or concrete mixers being machines for milling or disintegrating do not proportion or incorporate, hence are but poor substitutes for such work. The principles to be observed before establishing any sand mixture or composition are first the proper ingredients, second their correct proportions, finally mixing and incorporating the whole into one homogeneous uniform mass. In order therefore to obtain the best physical results from a sand mixture or composition their ingredients must be accurately proportioned. None of the machines previously outlined are capable of proportioning, consequently from the first the mixture is handicapped.

Another important point in the preparation of a sand mixture or composition is the regulation of its moisture content, making use of such moisture as a medium (when in solution) in the form of an emulsion for spraying on to the sand mixture when being incorporated. It might be stated on good authority that more scabbed cut castings are caused through damp sand than anything else.

Before installing a sand treating plant it is best to take into consideration the particular layout of the foundry, and the nature of the material it has best access to, in order to effect the greatest economy in labour. In the design of such a plant, the first thing when possible is to establish a central sand treating station within easy reach of rail or water to save transportation of sands. The machinery should be self-contained, so that one or two men can operate the plant according to amount of material required to be treated. Provision should be made with such machinery for accurately proportioning three or more different sands, compounds, or clays to suit any prescribed moulding mixture. Adjustment of such proportions must be also provided for within practical limits. Screening should be done mechanically, and the plant rendered dust and "fool proof" as far as possible. After proportioning, mixing and incorporating should be carried out the requisite number of times, and during the process of mixing and incorporating any glucose compound or oil should be sprayed on to the sand mixture, thus reducing the moisture content to a minimum. The whole mass should be then finally subjected to pressure by being rolled. Such pressure should be adjustable so any desired "temper" can be obtained.

DEFECTS IN BRONZE CASTING CAUSED BY IMPROPER GATING.

The manufacturers of the casting shown in cut Fig. 1 reported that they were experiencing considerable trouble in producing perfect articles. They reported the difficulty to be small pit holes which showed up upon machining in different parts of the casting. They tried to over-

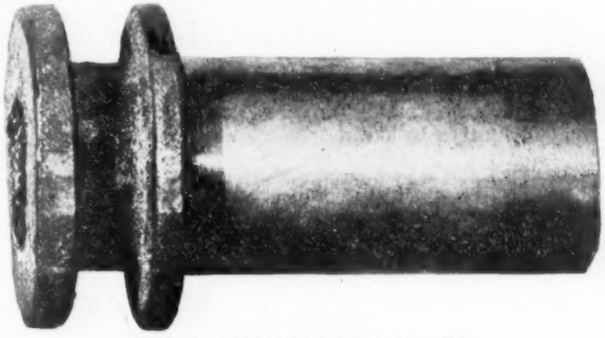


FIG. 1. THE DEFECTIVE CASTING.

come this trouble by the use of different fluxes and varying mixtures of core sand, but still the pit holes remained.

The matter was referred to the superintendent of the brass foundry of a large manufacturing company, and he reports that in his opinion the casting was gated at the wrong end and he submitted the sketches shown in Figs. 2 and 3, as to the wrong and proper way for gating. He remarks that as the casting was made of gun metal, 88 parts of copper, 10 parts of tin and two

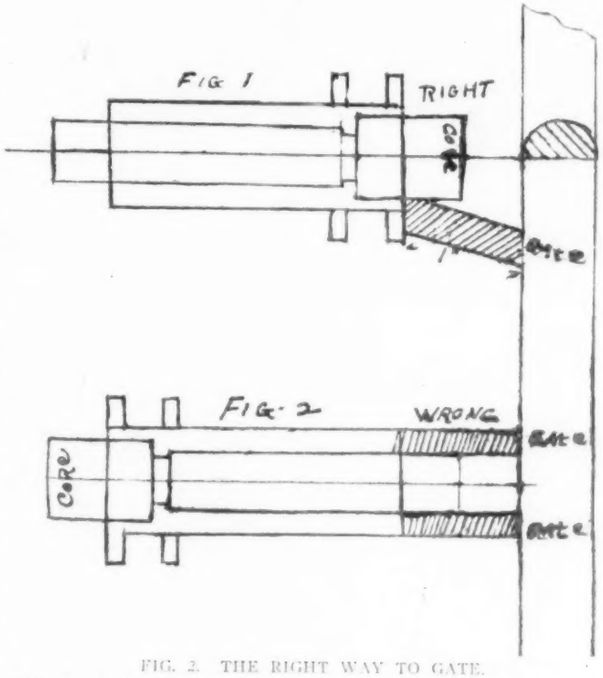


FIG. 2. THE RIGHT WAY TO GATE.

FIG. 3. THE WRONG WAY TO GATE THE CASTING SHOWN ABOVE.

parts of zinc and had been gated on the light end, as shown in Fig. 3, it was to be expected that the pin holes would appear. The reason for this opinion was that there is not sufficient metal in the gate to feed the casting, and as the gate cools first the pin holes are caused by shrinkage.

HANDICAPS OF THE ELECTRO-PLATER

A Few Remarks Relating to the Prevailing Lack of Scientific Knowledge.

By Progress.

A large percentage of electro-platers labor under a heavy handicap Ignorance. In making this assertion I do not mean the lack of knowledge and ability to handle men under their supervision, the perfecting of devices for handling work advantageously; nor in producing deposits and finishes that for beauty and durability bring words of praise and admiration from even the most fastidious and exacting critic. My criticism applies to the more or less haphazard way of obtaining results which are only successful through many failures, unscientific and doubtful experiments and a retentive memory which enable platers to recognize and rectify numerous difficulties which appear from time to time in the daily routine of their duties. The lack of technical knowledge is the crux of all their difficulties. Analysis is beyond their ken and being unable to diagnose each individual case are compelled to group their treatments into three or four general classes. When his trained eye detects distress signals he rushes to apply a remedy which proved efficacious in a somewhat similar instance. Knowing that delay will only aggravate the trouble and procrastination spells disaster he without confidence in the result or ability to determine logically the cause of the symptoms. Lacking appliances to obtain the facts but with hope that the operation will obviate the difficulty, is constrained to take immediate action.

So when a solution shows an indisposition he feels the pulse and takes its temperature; then administers heroic doses, guaranteed to kill or cure—according to luck. Alas! how many able bodied solutions, because of some slight indisposition, have succumbed to such strenuous methods, and passed into the great beyond, wet with our tears, as we sorrowfully consigned them to a watery grave, from which no solution ever has returned or can be resuscitated. All through our inability to understand volumes written and published covering every phase of the subject.

This ignorance is in no case more apparent than in the manipulation and upkeep of an acid copper solution. Therefore, let us consider, briefly, what essential details are usually found that handicap the average plater, necessitating guesswork for what should be undeniable facts. Langbein advises us of a simple way to ascertain the amount of free acid and also the content of copper contained in a given solution as follows: "The free acid is determined by titrating the copper solution with normal soda solution, congo paper being used as an indicator. Bring by means of a pipette, 10 c.c. of the copper bath into a beaker glass and add drop by drop from a burette normal soda solution, stirring continually, until congo paper is no longer colored blue. . . . The c.c.'s of normal soda solution consumed multiplied by 4.9 give the number of grams of sulphuric acid in the liter."

To the initiated the above is simplicity itself, but others will find two words requiring investigation. First, "Titrate" the dictionary defines—"To determine the strength of a solution by means of a standard" (in this case soda) "solution—or by titration as to its volumetric analysis." Second, "Normal" is defined as "according to an established law or principle, conforming to a type or standard, regular or neutral as to character formation or action."

Having thus fortified himself with the foregoing information, he proceeds to follow Langbein's directions, procures a pipette, congo paper, and soda. This upon receipt is usually decorated with a label thus "Sodium Carbonate" and beneath $Na_2 Co_3$—which may interest the chemist, but to which he attaches little or no importance, being only concerned in knowing how much will be required in making a normal solution. Why should he worry about these symbols? They mean nothing intelligible to the plater, although frequently found in the table of atomic weights in most plating books. So with assurance begot of ignorance he dopes out the conclusion that any given quantity will answer, and proceeds to make the test. No. $Na_2 Co_3$ can have no bearing on a normal solution, nor be a factor in the treatment of an acid copper solution. Having carefully concocted his normal (?) solution in conformity with these ideas, he next, as instructed, fills the glass from his pipette with the copper electrolyte—and from his burette feeds in the soda, and noting exactly the c.c.'s used multiplies by 4.9, which should give the grams of acid in each liter, provided the book is right and the soda solution normal. Why the authority used the figures 4.9 in preference to some less intricate one he has no way of knowing; but is inclined to censure Swedenborg for having complicated our mathematics with intricate decimals.

Having thus satisfactorily disposed of the question of acid, he now wrestles with the more complex question of the content of copper, according to Haën, here again our authority informs him plainly in detail, how to proceed and in doing so states: "Since 1 c.c. of a decinormal solution corresponds to 0.0249 grams of blue vitriol, etc." Does it? If not he must take the statement as correct, but that word "decinormal" makes him hesitate, for although past master in the art of guessing, even he gets stumped at times, and feels the limit was reached when he decided the solution was "free from iron." Which Haën stated was necessary for the correctness of the result.

The advice to read intelligently, nothing truly permanent or useful can be acquired without a plan, is as necessary in plating as in other callings. Assumption has upset many a plater's hopes and prospects. Let us then be provided with an authority on electro deposition and a standard chemistry to explain the terms used and statements made, taking nothing for granted that we can prove. Learning one point so thoroughly every day that it can be applied when occasion demands, and thus relegate ignorance to the rear and have success crown our every effort. Then shall the plater of yesterday be replaced, with his guesses, by the plater of tomorrow, with a full knowledge, which alone produces unfailing results.

SILVER, LEAD AND ZINC IN OKLAHOMA.

Oklahoma was the only one of the Central States which showed a larger output of both lead and zinc in 1913 than in 1912. The value of the silver, lead, and zinc produced at mines in Oklahoma in the year 1913, according to J. P. Dunlop, of the United States Geological Survey, was $1,855,217, compared with $1,101,042, in 1912. The metal content of lead concentrates increased from 3,388 tons, valued at $304,920, in 1912, to 6,228 tons, valued at $548,064, in 1913, and the recoverable spelter increased from 5,769 tons, valued at $796,122, to 11,664 tons, valued at $1,306,368.

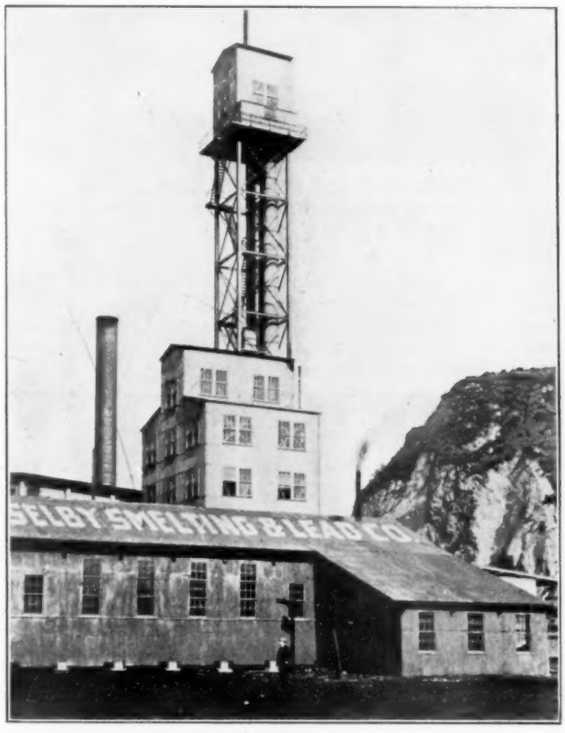
THE FORMATION OF LEAD SHOT

An Interesting Account of the Manufacture of This Important Article of War.

By James Scott.

The formation of shot, though of very common occurrence, seems to be one of those subjects that have attracted but little attention, even among men who are concerned in the metal industry. We have, to begin with, some molten lead, and finally, in regard to the formation itself, some hard spherical objects. I will make it my business to explain, as lucidly as possible, how these effects are produced.

Lead has been found to be the most suitable metal for the manufacture of shot, on account of its specific gravity, which is 11.3. The lead is hardened, preparatory to its conversion into shot, by the admixture therewith of a definite amount of arsenic, a substance which occurs quite commonly as a contamination in ordinary finished



SHOT TOWER OF THE SELBY SMELTING AND LEAD COMPANY, OF SAN FRANCISCO, CAL.

leaden products. The added arsenic in shot can be traced by the analyst, and in Fig. 2 I depict the result of testing one of these metal objects in the manner customary among scientists. After suitable extraction of certain substances the identity of arsenic is established by means of sublimation, that is to say, heating is resorted to, and the resultant vapor is caught upon glass. Upon microscopically examining this solidified vapor it is found to consist wholly of very minute octahedral and kindred crystals of exceptional brilliance. This sublimation is a really wonderful sight. The crystals may sometimes be traced on the surface of shot.

For the making of the larger kinds of shot the lead is hoisted to the top of a very high tower (which is so conspicuous a feature in some districts), while that intended for smaller varieties is lifted to a platform placed some distance beneath the other one. It is then melted and poured through trough-like tables having regularly perforated plates in them. Imagine a lidless box with a sieve-bottom, supported on four legs, and you will have an idea of the shape of one of these contrivances. The molten metal descends direct from these sieves through an opening in the floor, into a tank of water situated at the bottom of the tower. The bottom of this tank slopes so that the shot may slide down into one heap, instead of being distributed all over it.

A dredger arrangement lifts the shot out from the tank and transfers them into a large funnel down which they slip into a drying trough. For the separation of the shot into groups of regular sizes, a revolving sieve is employed; the shot being very neatly sorted out into various compartments. They are finally polished by means of graphite (known also as plumbago and blacklead) in a revolving barrel placed in a horizontal position.

The formation of shot falls really into the same line as that of rain drops and kindred objects, although there is naturally a considerable distinction between the various substances. What I mean is that each drop is a product of a descending *stream* of fluid, which breaks

Fig. 1. Two different samples of crude, unpolished shot, shown magnified. The actual size of each was 3/8 inch. In the first case rotation has ringed the shot; in the second the surface is semi-crystalline.

up rapidly into complete drops. Imagine that for one moment the process is suddenly stopped just after it starts. You will find that a filament projects downwards from the layer of substance, and has a tendency to split up, along its lower portion, into beads, *i. e.*, shot. The lower extremity has the greatest predilection in this respect, while a lessening of it occurs gradually as the higher parts are reached.

This behavior is due to what is known as surface tension, which may be best explained as a kind of miniature gravitation of the particles towards the middle or centre of the substance. The perfect filaments, whether short or long, thin or thick, are cylindrical. It does not, of course, follow that the filaments are exactly regular. They may be quite stumpy (see Fig. 3) and nodulated at their junction with the larger from which they are parting; but as they lengthen they become more symmetrical and may be termed correctly cylindrical.

Taking a single filament for examination we may assume that the middle area has a pull on the surface. This part of any object, and the filament must be temporarily regarded as an object, has its particles more densely packed together than those of the outside, otherwise there could never be any wearing out or decay of a substance. It is owing to this concentration that bulk is possible. The tendency for disintegration

from the exterior is not so powerful as the internal cohesive force, so that the outside, or rather its major portion, is drawn continually inwards. This tendency affects the extremity as well as the remainder.

Now suppose that a part of the lower extremity of a filament is snapped off. Instantly its "raw" end is pulled, as it were by the internal force, and automatically rounded off.

There we have the secret of the formation of shot.

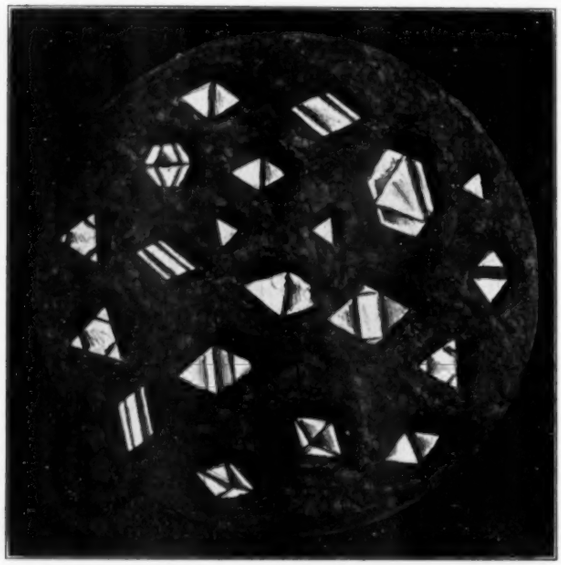


Fig. 2. The above circle was in real size a mere speck. It is very highly magnified, and shows the arsenical crystallization of a lead shot.

Because the lower half of the leaden filament is held together less strongly than the upper half, the metal breaks off more freely, and the same force which rounds off the extremity of the filament, similarly rounds off the top section of the detached drop. Regarding a single shot as it is forming, we must take it for granted that the internal force, due to the sudden concentration of its particles, thereby causing a greater density, acts equally on all the matter present in the drop. Symmetry is quite a common feature in nature, and in the case of drops the occurrence of an exact center would coincide with a uniform rotundity. This settlement of particles in a sphere is a very important fact, and may be understood by referring to No. 5. Of course, molecules are invisible, but this must be their behavior. A very good method of demonstrating the existence of surface tension is to introduce a small camel-hair brush into a completely full glass of water. The hairs immediately spread widely apart, owing to the stretching of the surface of the fluid. As the brush is lifted out, it resumes its normal shape. The top of the water makes a continual effort to round itself off because the internal force beneath is pulling it, but the sides of the glass prevent that consummation. If the glass could be suddenly removed, so that it would not interfere with the movements of the water, the internal force would shape it into a complete sphere.

Another means of showing the pull that is exerted on all sides of the water is to sprinkle a small quantity of bran on the surface. It immediately rushes from the center outwards in a curious manner.

It will be worth while reverting to the subjects of adhesion and cohesion. All metal workers are no doubt aware that pieces of lead (as well as copper and some other substances) adhere almost inseparably together after having been cut, and then pressed one against the other face to face. This behavior is really due to the power of adhesion, which is closely related to that of cohesion. The latter term refers to the inherent facility with which the particles of a shot (and those of other things) are normally bound together by mutual gravitation (See Fig. 5), whereas the former term signifies the power possessed by particles adhering together when brought into opposite contact with each other. Both forces have a great influence on the formation of a shot.

There are really two kinds of adhesion—those noticeable in drops and masses, respectively. The first mentioned concerns our present subject, because the molten lead falls in that shape. It is worth mention that the cohesion of liquids is much smaller than that of solids. Seeing that the metal is at first fluid, and that it subsequently hardens, we are presented with the phenomena of a gradual, yet rapid series of modifications from one state to the other. These changes must have a considerable effect on the development of shot.

It should always be remembered that shot during their descent revolve. This rotation must help very largely to produce sphericity. At the same time it is responsible for the many irregularities on the surface of shot, which need to be polished off before the shot are ready for distribution among those people who use them. In Fig. 1 I give two examples of the more remarkable phases of this side of the subject, drawn from the actual shot kindly supplied to me by the famous Lambeth manufacturers, Messrs. Walker, Parker & Company. The shot examined had not been polished, and it was evident that the patterns had been

Fig. 3. Diagram explaining how a shot is formed during the descent of the molten lead. From actual observation.

produced by the air and water striking against the revolving spheres.

Lead, like the majority of metals, is crystalline in fundamental structure, but the fact is not brought out, as a rule, until the microscope or lens is used in connection with it. In Fig. 1 is depicted the surface of a ⅜-inch crude shot, just as I found it. The crystals were not exactly perfect, and the shot was examined in a strong light so as to bring out the detail. The

figure to the left shows how a shot falling quite regularly has become banded, the effect probably being intensified by some of the hot, yielding filament being wound round it, and becoming consolidated therein.

Various shapes occur because the pieces of molten

Fig. 4. Shot caught in water placed at a short distance beneath the falling molten lead. In their long descent in the shot tower the upper projections are attracted into the body of the shot, while the filaments are wound round them.

lead fall against each other occasionally, although this result should not be expected in cases where shot is properly made. I noticed during my observations that the larger kinds of shot revealed the most conspicuously crystalline and scored surfaces. Some of the smaller ones exhibited them to a certain extent, but the air of the tower seemed to have exerted a polishing influence upon them which was not noticeable in the larger kinds.

In Fig. 4 are depicted some shot, about natural size,

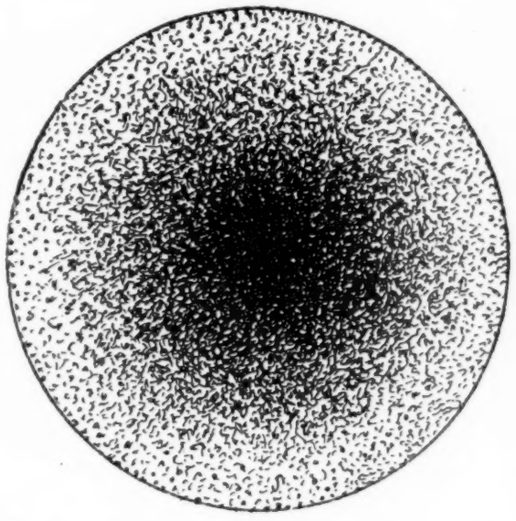


Fig. 5. Theoretical diagram explaining cohesive force. The molecules attract one another, and the mass is denser in the center than outside, where superior forces are at work.

resulting from an experiment I made when molten lead was poured through a hole in a metal plate and caught in water placed a few feet beneath.

USE OF COPPER SHEETS IN GREECE.

(United States Consul A. B. Cooke, Patras.)

There is considerable demand for copper sheets in this consular district, as is indicated by the customs statistics of the port of Patras. According to these statistics, there were imported through this port during the first six months of 1913 copper sheets to the amount of 39,678 pounds. The imports were divided, according to the country of origin, as follows: France, 19,132 pounds; Holland, 9,607 pounds; England, 9,425 pounds; Germany, 1,045 pounds; Belgium, 469 pounds.

Basing an estimate upon these statistics, it is safe to say that the annual import of copper sheets for the entire district falls little short of 100,000 pounds. These sheets are used for the manufacture (by hand) of kettles and casseroles of all sizes, for water pitchers, trays, and various sorts of kitchen utensils. The utensils are made in small shops by hand, the copper being hammered out by the forge and shaped into the desired form. The utensils when finished are usually silvered on the inside, a process which has to be repeated from time to time, as the silvering wears off from use.

Importers state that the terms offered them by European exporters are "cash against documents, Patras." So far as this consulate has been able to learn, the local merchants have never tried the American copper market. Several of them have expressed an interest in that market and would be glad to find whether it will be to their advantage to place orders there. [The names of two interested persons may be had from the Bureau or its branches.]

It may be of interest to American exporters to know that there is a direct freight communication between Patras and New York, and that by applying to the proper shipping firms in New York they can probably secure direct quotations to Patras.

There is little demand here for copper wire or electric supplies.

ROLLING OF ZINC.

Experiments have been conducted in Belgium with a view to discovering the effect of foreign metals on the rolling of zinc. Ingots weighing 40 pounds were prepared by casting together zinc alloys of various metals, with spelter containing lead 1.05 to 1.25, cadmium 0.076 to 0.11, and iron 0.03 to 0.039 per cent. It was found that cadmium is harmful above 0.25 per cent., while with 0.5 per cent. rolling is impossible. In regard to arsenic, 0.02 per cent. markedly increases the hardness, and with 0.03 per cent. the metal is too brittle for practical purposes. Antimony is less objectionable than arsenic as regards hardness, as 0.07 per cent. does not increase the hardness; but 0.02 per cent. is enough to produce a striated surface on the rolled sheet, which makes it unsalable. Tin is objectionable when above 0.01, and prohibitive at 0.03 per cent. Copper has no hardening effect until it reaches 0.08, and with 0.19 per cent. the zinc is unworkable. A permissible maximum of iron is 0.12 per cent., but this is easily reduced in refining. Though 1 to 1.25 per cent. of lead does not interfere with the rolling, a slight increase not only seriously affects malleability, but the excess of lead remains unalloyed and forms patches on the sheet. The presence of two or more impurities together results in a combination of the injurious effects of each.

A FEW BRIEF POINTS ON BRASS SOLUTIONS AND PLATING

EXPERT ADVICE FOR THE HANDLING OF THIS SOMETIMES TROUBLESOME PROBLEM.

BY L. G. KROUSE.*

There are many formulae on brass solutions and also a great deal of literature written on the making and management of them. There are also a great many platers who have their own particular way of making a brass solution and which way is only known by them. When the time comes for a novice to do this kind of plating he is at a loss to know how to proceed and what formula to use for his particular class of work, and right here the mistake is often made, as there are no brass solutions made for plating any particular kind of work. There is only one brass solution, and that is the one that plates brass, whether one is working on hard or soft metal. The solution is the same as all other brass solutions and if not, instead of getting good brass deposits, one will have a lot of useless trouble.

A plater often hears of different things to put in the solution to get certain results, and when he can't seem to make it work the way he wants to, he begins by adding a few of these so-called "dopes." Still not receiving any relief he is under the impression that not enough has been added, so he makes further additions until he becomes so confused and discouraged that he gives the thing up in despair. Yet there may have been just one simple rule which the operator did not know of, and which undoubtedly was causing the trouble.

The best platers do not owe their skill to the formulae they have for making their solution, but to the fact of knowing how to operate them. The solution itself is not as important as the knowing how to operate it, and should not be the first thing looked into in case anything suddenly goes wrong. If a bath works well for a half a day there is no reason why it should not work properly at all times. The prevailing trouble in plating, if any, in these modern times, is invariably due to the source of current. In modern shops that are so constructed that all classes of plating are done under one large dynamo, the operator is always getting changes in his current strength every time he fills up or empties several tanks and these changes always affect the other solutions that are in operation. This is especially noticed in brass and bronze solutions. The first requisite the operator must bear in mind in order to do good brass plating is that the solution must be absolutely as clear as water, with the exception of a little tint in the color. The least cloudy effect will indicate that the metals have not set and plating should not be resumed until this is overcome. Another thing to consider is the size of work that is going to be plated, and the distance the anodes should be from the work to be plated ought to be as great as, if not greater, than the breadth of the articles. If a large piece of work is put in a narrow tank the part nearest to the anodes would receive the best color while the remote places will show paler shades. The next and most important of all is the current regulator. Without this, brass plating would be an impossibility, and the best kind of a current regulator to use is a switchboard that has eight or ten steps with wire that will correspond to the size of the tank. The best way to find this out is by filling up the tank with work and using the kind of wire that will not allow the work to gas when on the weak side of the switchboard, and one size of wire will give the best results. Care must be taken that the work will not gas any more on a small load than on a large one. This is very important, and the success of brass depositing lies right here. If work that has been in the bath ten minutes loses its brightness at the end of twenty or thirty minutes at the extreme points, it will show that the current is too strong and should be reduced according to the length of time that is given for the work. A great deal of time and trouble will be saved in leaving the solution run its own way than by increasing the output by putting on more current in order to knock off a few minutes on each batch of work.

If you are sure that there is something the matter with the solution, do not be afraid to add copper that is dissolved in cyanide. Copper will seldom harm the solution, as copper forms the body and makes the bright finish. Without the excess of copper the color would be dull and not a high brass color. Do not put too much faith in arsenic and soda, but more in the copper and current. Orange and yellow or streaky effects always indicate too much zinc, which can be overcome by copper additions. In working a new solution, take note of the color on the work, and also the racks, the racks particularly, or if racks are not being used for the work look at the places where the most resistance is, as there may be a good brass deposit there and an orange or redder color on the more exposed parts that would indicate that there is enough copper in the solution, but the current is too strong and must be reduced until the work shows an even color. If, on the other hand, the racks or remote places show a yellow or orange shade, whether the current is weak or strong, more copper is needed, and it will have to be added until these places show the same color as other parts of the work.

A change of color while the work is being plated is not any fault of the solution. This sudden change is caused by the current and generally happens when a very heavy load has been taken off the dynamo or put on. The operator must be on hand ready to regulate the switchboard in time so the brass solution can go on without a change in the shade. Some platers, when making a brass solution, prefer to use their own carbonates, which is a good plan, for the simple reason that freshly prepared carbonates that have not been dried out will dissolve quicker, whereas the dry ones will require a day or so before being perfectly dissolved into a fit condition to use. The chemical purity of the two carbonates in this case would be too small to consider as one is about as good as the other. The quantity of carbonate of copper and zinc to use would be about two of copper to one of zinc and they should be dissolved in cyanide, using enough to dissolve the metals. The point is to have just enough cyanide to take up all the metal there is; when you begin to add an excess you will know just how much excess there is in the solution.

In dissolving the metals either from the dry or wet carbonates, be careful that too much cyanide is not used in getting the solution clear, as it is better to have the solution a little cloudy, provided the metals are pretty well dissolved. This cloud effect is caused by the metals not having time to set, but if the solution is left over night it will be quite clear in the morning. There may be a sediment on the bottom of

*Bridgeport, Conn.

the tank after leaving it stand over night, and the solution should be separated from this sediment, otherwise it is certain to rise when the plating is going on and cause a lot of trouble and bad work. As a new brass solution is agitated more or less by examining the work and adding ammonia, etc., I especially advocate the policy of having the solution as free from sediment as possible.

If soda is going to be used in the solution, no particular advantage will be gained by its use, and if it is left out the solution will be so much better off. Soda is a great destroyer of cyanide, while cyanide is a great re-actor on the deposition of metals. If too much cyanide is in the bath it will resist all decomposition of metals and result in no deposit on the work that is being plated, and must be overcome by the addition of metal instead of soda. When this condition occurs in a slight form and the work does not seem to plate even, the operator is under the impression that his solution does not conduct properly, and proceeds to add what he believes to be conducting salts. The so-called conducting salts are not true agents. They may help the solution to conduct better, but to this effect they partly destroy the cyanide; hence, setting some of the metal free, which immediately goes on to the work in plating. When all the freed metal has been taken out of the solution, you are in the same position as before putting it in, and a little worse, because the cyanide has been degenerated into a condition that does not leave it powerful enough to hold the metals together in the solution or dissolve metal from the anodes. The oxides which begin to form find their way towards the anodes, coating them over and making it more difficult than ever to even get any conductivity at all. The soda is the main cause of the anodes coating over, as they actually kill the cyanide, which is the backbone of the solution, leaving it powerless to dissolve metal from the anodes and keeping them free of all oxides.

The old time platers advocated the use of different kinds of chemicals, etc., in certain solutions, and I believe the origin of this was due to the current force, which was not understood as well in those days, and the solution had to suffer in consequence. As dynamos are constantly being improved and the experienced platers are giving more attention to the most important part, the current, all these extra additions in solution will be virtually disposed of and the least amount of useless chemicals, etc., in the solutions will be their slogan.

After having made the solution and if same is ready for use, it will naturally want to be tried out to see how it works. The way to proceed with this would be to fill up the tank with the work, being sure that this first batch of work is very clean and bright and as free from all oxides, etc., as possible, for if there is the slightest film of oxide on the work it will not plate up. When the tank is filled up, turn on the current, and if it does not plate a good brass color when the switch is in the center, move it over to the strong side to see what is the matter. If, after sending the strong current through, it shows a red color, ammonia will be needed; move the switch back to the center and add a little ammonia (about a half pint of 26% to every fifty gallons of solution). Do not add all the ammonia at once, but dilute it in four or five times its weight with water and add one-half at first, for if too much ammonia gets in the solution when it is new it is apt to cause the work to come up grayish. When the solution has been thoroughly saturated with ammonia, which will take several days, there will be less danger of this happening. Take note of the racks, as these should show a brass color as well as the work. The racks are where the most resistance occurs, and if they come up a good brass color the solution is all right. Should they, on the other hand, show a yellow or orange shade, it will have to be found out whether the current is too weak or whether more copper is needed. Increase the current or put more anodes in the tank, and if this does not overcome the fault, copper will have to be added to the solution. It is the copper that makes the work plate green in the deep places or places that are farthest away from the anodes. If you cannot get these parts to plate that color unless you are compelled to put on so much current that it causes the more exposed parts to come up too much on the copper or bronze color, you must keep adding copper to the solution until it gets the same even color all over and with just enough current so the work will scarcely show any gasing while plating.

When working the solution, the way to keep in touch as to how it is working, always look at the deep places and parts where the resistance is the greatest, and it will always be possible to guide yourself as these places are the first to kick up if the current or solution has changed. Do not have the solution over twelve degrees Hydrometer test for still work, and do not add dry carbonates when the solution is once in use. Always dissolve them thoroughly in cyanide first and then they can be added even while the work is being plated in the solution without causing sandy effect. It is not absolutely necessary that the solution should test twelve degrees, for if it is started with a test of eight degrees and getting good results, it can be gradually built up under your own care.

The anodes should remain free from scum, with the exception of a little oxide on them which, when rubbed over with the finger, shows the bright metal underneath. It is the hard scum that sticks on and cannot be removed, only with much effort, that is the bad feature. Where this occurs the cyanide in the solution is becoming dead, and if it cannot be remedied by addition of fresh cyanide, part of the solution will have to be taken out and water added to purify the solution, followed with the cyanide. This way is always sure to succeed.

Don't be under the impression that a brass solution has a day off once in a while, or that it cannot be right all the time. If the solution works well one day, there is absolutely no reason why it should not work properly every day. The fault in this case is usually due to the plater, and nine times out of ten the trouble can be traced to the current, but he must be able to find out the right fault at once, and this can only be learned by keeping at it. Study up your solution in your own practical way, and if you have a good eye and a level head you are bound to succeed. Whenever you are having trouble, which all platers do, and cannot seem to get any headway, the best plan is to get outside help, which will save a great deal of anxiety for oftentimes a little thing may be causing a lot of trouble and cannot be located. There is no set rule on when to feed a brass solution, and the platers who are in a habit of doping it up more or less every day are the same ones who are in the habit of throwing a lot of good solution down the sink. A good brass solution should do about twenty per cent. less than a cyanide copper in the amount of work being plated, and the time required to produce a coat.

The following is a formula for a brass solution containing no soda:

Carbonate of copper.....	6 ounces
Carbonate of zinc.....	3 ounces
Water	1 gallon

Cyanide should be used to dissolve the metal and enough excess cyanide should be added to keep the anodes clean. Ammonia can be added after the solution has been tried out. If you are going to make your own carbonates use about 6 ounces of sulphate of copper and 3 ounces of sulphate of zinc to the gallon of water; the sulphates can be dissolved together in the same pot and precipitated with carbonate of soda, or can be done separately. Enough carbonate of soda must be used to separate all the metal from the solution, which will be a little in excess of the amounts of sulphates used, the precipitate may be washed a few times before using.

Your dynamo should register between 4 and 5 volts for best results, and it should maintain its voltage continually.

With a word in conclusion, would say that there is no end to defects that may cause trouble to the inexperienced plater, such as, work not being properly cleaned, which causes blistering, or oxide left on the articles, which causes cloud deposits, or metal being attacked too much by dips, and potash, which prevents a smooth deposit. All these things must be in the plater's knowledge so he will not acquire false impressions about his solution.

THE CONTROL OF PHYSICAL CONDITIONS IN ELECTROLYTES

A Description of a New Device for Reducing Amperage While the Voltage Remains Constant.

By F. A. Rojas.*

The electro-deposition of metals is due to the physico-chemical action of the electric current through which cathodic and anodic migration of ions takes place in a dissociant fluid; the kation ions going to the negative electrode and the anion ions to the positive electrode. If in the electrolyte the dissociant fluid is water and the dissociated substance is a metallic salt, the hydrogen and the metal being kation ions will go to the cathode while the oxygen and acid radical being anion ions will migrate to the anode. To accomplish this dissociation of the electrolyte a specific electromotive force must exist between the electrodes. This quantity varies according to the kind of electrolyte.

Under the present condition this electromotive force averaging from ½ to 2½ volts is too great a value for successful plating, inasmuch as the strength of current that it sets up in the bath produces an electrolytic deposition which is too rapid to give good results if the logical anode surface is used.

F. A. ROJAS.

This electromotive force cannot be diminshed; it seems then that the alternative in order to reduce the current strength is to increase the resistance within the bath. This view is substantiated by the fact that in a silver bath the best results are only obtained when the anode surface has been reduced to a comparatively small proportion in relation to the cathode surface. But this practice is bad as it does not insure a good distribution of the electric current and the self feeding of bath from anode.

In the nickel bath this resistance is obtained because the bath itself is a bad conductor, therefore making possible the use of a large anode surface. But the poor conductibility of the bath presents a bad feature of interposing a high resistance between the high and low points of the cathode. It logically follows that the best electrical conditions for an electroplating bath would be that of an electrolyte having great conductibility, the use of high voltage, and relatively low current strength.

The rate of electrolytic deposition is directly proportional to the quantity of Coulombs or product of the strength of the current, in amperes, and the length of time in seconds: that is, the greater the amperes per second or the greater the seconds per ampere, the greater the amount of deposit. From this statement we infer that the more amperes we may be able to use per given time the quicker will be effected the process of plating. Unfortunately, however, in the present state of the art if a uniform and homogenous plate is desired it is not possible to use a great rate of amperes per second and per square inch of surface of cathode. In this respect we are limited to a relatively small amount of current. Many factors enter into play that will tend to sacrifice the strength of the current to the length of time: for instance, the evolution of hydrogen, presenting a mechanical disturbance to the coherency of the deposit and the low conductibility of the electrolyte, or bath, in comparison to the conductibility of the article to be plated.

There are three prime conditions that every electroplating bath must fulfil in order to produce successfully an electro-plated coat of metal upon the negative electrode or cathode. These are a coherent, uniform and good color deposit. The evils that work against a satisfactory accomplishment of these three requirements are of two natures: chemical and physical; so far the study and experimental investigation of the chemical end have been exhaustively pursued; but, unfortunately, the physical considerations of this art have been little regarded, if at all. Nevertheless successful plating is only possible when both the chemical and electrical principles of this knowledge have been complied with: for this is not a proposition involving pure chemistry, but an art derived from the science of electro-chemistry. I may authoritatively state that whatever success has been accomplished in this matter is due to the fact that its investigators have accommodated, to some extend, the chemistry of some electrolytes to certain given electrical conditions.

It is not my object, in this presentation, to treat on the chemistry of electrolytes, but solely upon their electrical considerations. Among the physical evils that hazard the accomplishing of good plating is the impossibility of

*President, Rojas Electro-Chemical Company, New York.

building an electrolyte whose electrical conductibility could equal that of the cathode.

Again we have the setting up, within the bath, of local and battery currents, working counter to the electric plating current. These two adverse factors are accountable for the unevenness of the electroyltic deposit: that is, the deposit being heavy on the high lights and light in the ground work of the cathode. I hold that this evil would be minimized and practically removed if the required amount of ampere per square foot could be driven at a much higher voltage than what is being used at present: that is, if we could increase the voltage without increasing the amperes.

At the present time the adjustment of the amperes for a given cathode surface is accomplished by increasing or decreasing the voltage by means of rheostats. In most baths the electromotive force hardly amounts to three or four volts, and at this pressure the current barely has power to penetrate into the recesses or overcome the counter-currents, and, therefore, will precipitate the deposit mostly where there is the least resistance: that is, upon the salient points rather than pierce through the high resistance offered by whatever electrolyte there is between the high points and the bottom of the recesses.

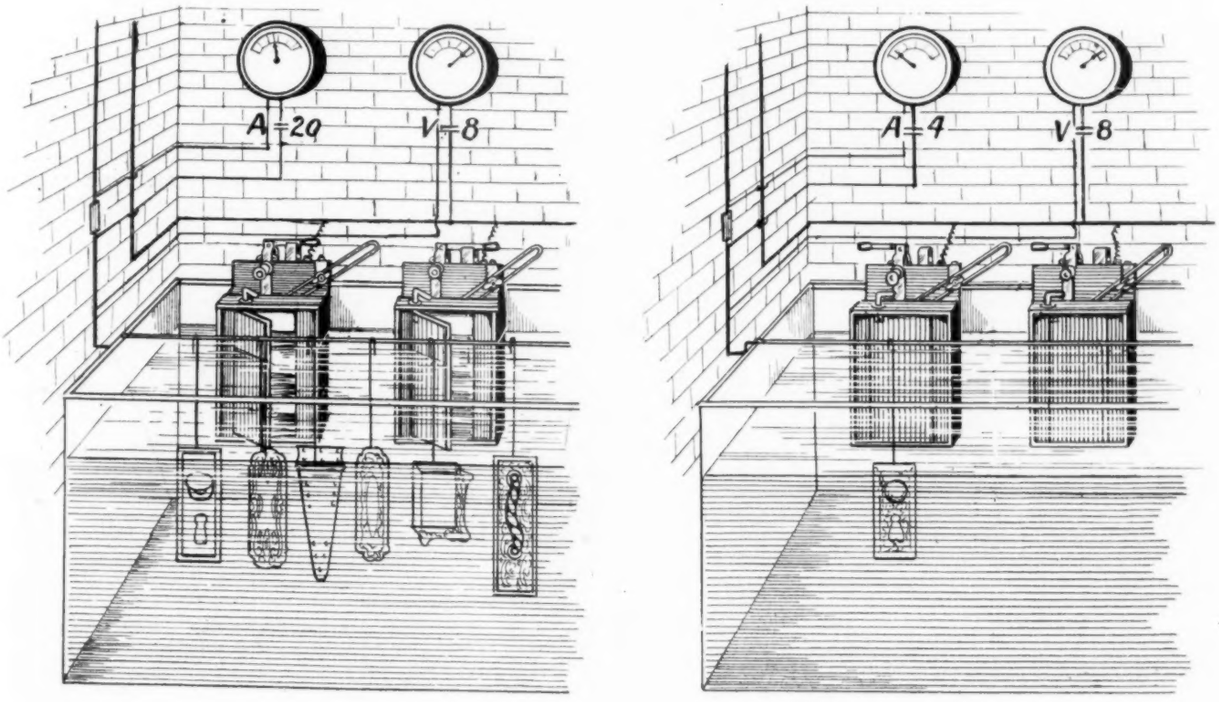
According to Ohm's law

$$C = \frac{V}{R}$$

that is: that the current C will increase or decrease by increasing or decreasing the voltage V; or by increasing or decreasing the resistance R: expressed technically the electric current in amperes is in direct proportion to the volts and in inverse proportion to the resistance.

The present way of adjusting the amperes is accomplished by varying the voltage. In our new system we regulate the amperes by varying the resistance, and through the use of the device, called the Rojas Direct Ampere Rheostat, shown in cut, the current in proportion to the cathode surface can be regulated with perfect ease and accuracy, independently of the voltage, thereby making it possible to use the required current at high voltage. By this method none of the current is wasted by cutting down voltage in the line rheostat as now done.

The electric principle employed is to interpose a variable resistance to the current flowing between the electrodes. The anode is enclosed in a box, having a gate, which when open allows the current to pass freely as usual, but on closing the gate a high resistance is offered to the current; the amount that can pass is materially reduced, while the voltage remains constant. For a very small cathode surface what current does pass may be too great. In this case open the switch shown at top of rheostat; now the current passes through wires shown on the side, the ends of which are immersed in bath, forming a small auxiliary anode behind the regular one. The current passes through the electrolyte to the large anode, from thence to the cathode. The added resistance reduces the amperage, while giving all advantage of large anode surface contact with bath. With this simple, scientific arrangement the plater, estimating the cathode surface and knowing the amperes required, adjusts the gate until the ammeter registers this amount. If several rheostats are in use they may be connected so that the gates are all regulated at one time.



THE ROJAS DIRECT AMPERE RHEOSTAT.

The first picture shows the tank full of work, anode switch closed and doors of box open. The auxiliary anode lever should be in a horizontal position. The amperage is 20 and the voltage 8. In the second picture the work in the tank is reduced, the anode switch is open, the doors are closed and the amperage is 4 while the voltage stays constant at 8.

IRON IN BRASS

AN ENGLISH VIEW AS TO THE MOST SUITABLE TYPE OF MAGNETIC SEPARATOR.

BY MAGNETO.

I was much interested in the article by M. Dings on the above subject in THE METAL INDUSTRY, April, 1914, and being actively interested in the manufacture of magnetic separators, would like to draw attention to a few other points of importance to users or prospective users of magnetic separators. I fear that, in the absence of practical experience in the use of such apparatus, the prospective buyer is generally imbued with the idea that a magnetic separator is a magnetic separator and that is all that is in it, and will consequently be induced to purchase an apparatus which possesses the attractive feature of cheapness rather than investigate thoroughly the different apparatus before deciding on the most efficient, though maybe more costly. In this respect I have known firms to whom the expenditure of £1,000 in another direction would be just an incident in the day's work, who will refuse to spend, say, £25/30 on a good magnetic separator because they can buy another—a magnetic separator for £10! The apparatus for removing iron from many materials may be entirely unsuitable for brass turnings and vice versa.

In treating washings from caster's ashes, there will always be found, in addition to what I will call good, honest iron, numerous particles of what might be termed feebly magnetic slag, which contains a small percentage of iron imbedded inside, but owing to the weight of slag being perhaps 100 times as great as the particle of iron imbedded therein, is not sufficiently magnetic to be held or attracted by the type of separator which is quite capable of securing the good, honest iron owing to its greater magnetic permeability. This fine slag cannot be thoroughly washed out of the metal and hence must contaminate the latter when remelted. It can be removed by a suitable type of separator.

Theoretically, for a magnetic separator to be really efficient, every particle of material to be treated should be delivered to the separator in such a manner that the next particle to it is not touching it. In practice the process for many people would be too slow. How often does one see a magnetic separator designed to treat effectively, say, ½ ton per day being rushed to do 1 ton instead? With the theory just expressed, how can it be possible for a satisfactory separation to be made when the material is being poured on to the separator so that particles lying on the top of a layer of brass are practically insulated from the magnets? Such a user will probably and most likely rush the metal over the separator two or three times in the expectation (only, of course, partially realized) that what was missed the first time will be caught the next.

As Mr. Dings points out if the brass chips are greasy or wet, fine particles of brass are likely to adhere to the iron, but a more serious aspect is that some of the fine iron particles will adhere to and pass away along with the brass to contaminate it. In a specially designed magnetic separator the recovery of the brass carried along with the iron is a very simple matter; in others, one may pass the material over and over the machine again and again, and continue for a month and not succeed in recovering it—this, of course, means waste. Where such material has to be treated the separator should be capable of successfully recovering every free particle of brass from a mixture of 99 per cent. iron and 1 per cent. brass.

Of course, where a piece of brass becomes entangled with iron, or a chip of iron is enclosed by a curl of brass, it is purely a matter of luck (outside of the scientific explanation which could be qualified by a hundred different conditions) whether the magnetic separator secures it or not. I fully commend Mr. Dings' advice to sieve out all rough material, including rubbish such as wood, cotton waste, paper, rejected sandwiches, etc., which find their way into such material. This method ensures an even feed.

Carrying the theory expressed above still further, the iron should come into actual contact with the raw magnets which cannot be too powerful if the utmost efficiency is to be obtained, as the more minute the particle of iron the greater the difficulty of separation. This is not generally understood—rather the reverse. The type of separator which treats the material by means of the raw magnets is unfortunately apt to carry a much larger percentage of brass with the iron, and in one type, though most searching as regards the removal of iron, does not automatically discharge its iron. This at first sight appears to the prospective buyer to be a fatal objection, but it is far more apparent than real and, unless a man is absolutely wedded to automatic working, will be dismissed in favor of the more searching and quicker work performed by this particular machine.

In the type I refer to the separator consists of an inclined magnetic shoot or trough with a lateral oscillating motion and provided with an oscillating feed tray. The material is fed as usual into a hopper and rolls and tumbles down the magnetic shoot encountering a series of raw electro-magnets. If the first magnet is passed each of the others has yet to be encountered, and by the time the brass reaches the bottom has been thoroughly and systematically searched. Occasionally the feed is stopped, the current switched off and the iron then travels down and is diverted into a receptacle for it. The whole operation takes only a minute, but the results as regards the finished material are beyond question.

In conclusion, though I quite expect to be scoffed at, I am strongly of opinion that in these more enlightened and competitive times no brass foundry of importance is properly equipped (always assuming that efficiency and economy in every and the strictest sense of the word is the watchword) by any one type of magnetic separator, for the simple reason that no one apparatus can treat every kind of material in accordance with the watchword defined above. The first and most important type must be capable of treating every kind of material turnings, washings, small scraps, etc., quickly and thoroughly as regards the removal of iron; the second machine (a small one) for treating tailings of the first—this to ensure no waste. Magnetic separators are not bought by the dozen nor half dozen, and the demand being very limited and the cost of selling large, a really efficient apparatus cannot be cheap. The cost might reasonably be considered in the light of a single insurance premium to prevent faulty castings and bad metal by reason of the presence of iron, and in no case can it be a bad investment, except it be too cheap to be good.

CORE FOR BABBITT.

It is often necessary in making things of babbitt metal to core out some of the parts. A very good core is made of common salt and glue. Mix just enough of the glue into salt to make a stiff paste, which is then formed into the desired shape or molded in a core box and allowed to harden. This kind of a core can be removed from the casting by soaking it in warm water.

SOME SAFETY FIRST HINTS

VALUABLE ADVICE NOW BEING GIVEN OUT BY MANUFACTURERS TO THEIR HELP.

BY A. BRAIN.

Mr. A. Brain, superintendent of the Burroughs Adding Machine Company factory, at Detroit, Mich., one of the leaders in the universal "Safety First" movement, gives some safety and sanitation hints to the employees that have been adopted by other manufacturers.

1. Treat your shopmates with courtesy and work in harmony with them.

2. Acquire habits of caution for your own protection and for that of your shopmates.

3. Use general tools with care and return them in as good condition as when taken.

4. Avoid wearing loose fitting clothing and jewelry or gloves, in the hand especially, around machine tools.

5. Before throwing in power, always look the machine over carefully and be certain every part is in working order.

6. Adjustments and oiling should be avoided when a machine is running.

7. Whenever possible, start a machine by hand to be sure all moving parts are free.

8. When in doubt concerning your work or the operation of any machine, ask your foreman.

9. When operating a machine, give the work your undivided attention. It may save spoiling a job, if not more serious damage.

10. When taking charge of any equipment, examine it carefully and report any breaks or defects, otherwise you will be held responsible.

11. Never fool with a machine and avoid scuffling with shopmates during working hours.

12. Do not leave material, tools or work lying on the floor where anyone might stumble over them, nor in overhead trestles or platforms where they might fall or be jarred off.

13. It is extremely dangerous to set cutting tools in a moving machine.

14. Do not lounge on a moving machine and keep a respectable distance from all moving parts, especially gears and cutters.

15. When through work, clean the bench, vise or machine with brush and waste, and see that all small tools are returned and checked.

16. Before throwing in an automatic feed, be sure the stops are set so that no damage will be done either to the work or machine by its use.

17. Form the habit of never standing in line with swiftly revolving parts, such as emery wheels, pulleys, etc.

18. Practice economy in use of oil, waste, emery, files and other supplies, as careless waste of these things causes enormous losses in many shops.

19. When working around a dangerous machine, be sure good footing is provided and never remove guards or safety devices unless absolutely necessary in order to do the work.

20. Never leave waste or rags where they might ignite or cause fire.

21. Grind over lapping edges of chisels, drifts, punches, set hammers, etc.

22. Never pound or hammer a file.

23. Form careful habits and cultivate a thoughtful and deliberate frame of mind when about your work.

24. An orderly exit of employees at noon and end of the day is important, especially when it is necessary to descend staircases.

25. The wearing of long coats by workmen will be discouraged. Aprons not ragged and fastened with strings that will not break easily under strain are better.

26. Never attempt to stop a machine by grabbing the belt.

27. When replacing a belt, stop a machine dead or reduce speed less than one-half.

28. In replacing belts, adjust them on the driven pulley first.

29. When handling a belt between two overhead pulleys, never place the ladder between the shafts nor rest it against a revolving shaft.

30. Do not be ashamed to shift belts with a stick instead of the hand, and for overhead work, always use a stick reaching nearly to the floor.

31. If you will shift a belt by hand, use the palm with thumb and fingers extended and look out for metal splicings.

32. Do not remove or tighten oiler nut by the power of the machine or without oiler being touched at outer end.

33. Do not wipe chips from revolving cutter with the fingers on a steel scale. Use a brush on the off side and with care.

34. Never reach across the revolving oiler to regulate the oil feed.

35. Be sure stops are set and that everything will run clear during the entire cut before throwing in feeds.

36. Never leave a machine with the automatic feed on.

37. Shut off power before throwing in back gears.

38. It is dangerous to wear finger rings while at work, especially those engaged in handling boxes, working on drill presses and milling machines.

39. Do not step on or off the elevator while it is in motion.

40. Don't obstruct fire doors.

41. Don't pour gasoline into the cuspidors.

42. Don't put rags, waste, paper or wood on the heating system.

43. Be careful about lighted and unlighted matches.

44. Hang up oil soaked clothing so that air will get to them.

45. Don't clean machinery with gasoline.

46. Don't play with fire fighting apparatus.

47. Put all oil soaked rags in waste can. That's the right place for them.

48. Have at least the courtesy not to smoke during gymnastic exhibitions in the gym. It's bad practice.

49. Do not attach fans to the spindles of drill presses, milling machines or other tools.

50. An efficient workman thinks before he acts. Are you efficient?

INTERESTING CASE OF METAL FRACTURE

THE INSTITUTE OF METALS HOLDS AN EXHIBITION OF DEFECTIVE METALS.

At the recent meeting of the Birmingham Local section of the Institute of Metals, held at the works of the Muntz Metal Company, Limited, French Walls, Smethwick, England, there was an exhibition of specimens of metals illustrating defects arising in manufacture or due to the constitution.

Among these specimens the copper tube shown in the cut affords perhaps the most interesting illustration of any of the forty-one samples which were shown. This copper tube had split in a curious wavy line in the process of manufacture. This fracture occurred in opening up a tube which had already been given one draught after being pierced.

Such a specimen, the writers of the notes stated, they had never seen before. Once a short piece of tube commenced to crack in this waved form, but the crack after describing only two complete waves continued in a practically straight line. They had never been able to discover any satisfactory explanation of the curious form of fracture. The copper, it was stated, was not satisfactory, being rather "cold short." Microscopic examination of one sample proved it to have been gassed. Mr. Sheppard stated that since his note was written his attention had been drawn to a description in the Engineering Magazine (Americai) of a similar phenomenon occurring in tubes of an entirely dissimilar material, one of a non-metallic character. It had been suggested in that case that the harmonic outline of the curve might be regarded as proof of the perfect homogeneity of the material.

The chairman said that this phenomenon of a harmonic

HARMONIC FRACTURE OF A COPPER TUBE.

fracture was entirely new to him, and the idea that the shape of the curve might be taken as a proof of the homogeneous character of the material was novel and interesting. A fracture somewhat similar might be produced by rolling metal at an angle of 45 degrees, but in that case the angles would be sharp, whereas in this case the corners were rounded off.

Mr. Henman said that he had seen a fracture very much like that in a copper alloy. The marks seemed almost to correspond with the gearing of the rolls.

Mr. Vaughan Hughes said that it seemed to him that each of the turns in the crack might correspond with the teeth of the gearing.

Mr. Sheppard pointed out that the wave in the crack slowly died away, the depth at one end being greater than at the other. That did not suggest correspondence with the gear. Directly they started to expand the tube it began to split.

The chairman remarked that on the homogeneity theory the lengths of the waves should be the same, but on measuring them he found that that was not the case. Therefore he thought it could not be a harmonic vibration. If there had been any change in temperature during the splitting, the elasticity of the material might change and that might account for the variation in the length of the waves; but assuming the material to be uniform, the waves on the homogeneity theory ought to be of the same length.

Mr. Sheppard said that there might be, as the chairman had suggested, some difference during the process in the hardness of the material. The dying down of the waves might represent a gradual decrease in the temperature.

A member suggested that the explanation might be found in the machine having pulled up a little during the drawing.

Mr. Sheppard did not think that could have been the case. They had one motor-drive acting on several pinches, and he believed the drive was perfectly regular.

Mr. Johnson suggested that perhaps the temperature due to friction would be greater at the end from which the crack started.

Mr. Sheppard thought the tube would have split in any case, owing to the copper being "cold short," as was proved when Mr. Reilly examined a sample of it under the microscope. It was pure copper, and the oxygen in it was .027 per cent. They had never had anything of the kind before except in the case of the other tube which, as he stated, only just started to go in that way. Sir Gerard Muntz told them he had never seen any other split of that kind during all the time he had been there.

ALUMINUM FACTS.

PRODUCTION.

The magnitude of the aluminum industry is shown in the following table, which gives the production since the beginning of the industry in 1883 and the domestic consumption of the metal since 1904:

Production, in pounds, of aluminum in the United States, 1883-1913.

1883	83	1900	7,150,000
1884	150	1901	7,150,000
1885	283	1902	7,300,000
1886	3,000	1903	7,500,000
1887	18,000	1904	8,600,000
1888	19,000	1905	11,347,000
1889	47,468	1906	14,910,000
1890	61,281	1907	17,211,000
1891	150,000	1908	11,152,000
1892	259,885	1909	34,210,000
1893	333,629	1910	47,734,000
1894	550,000	1911	46,125,000
1895	920,000	1912	65,607,000
1896	1,300,000	1913	72,379,000
1897	4,000,000		
1898	5,200,000	Total	377,737,779
1899	6,500,000		

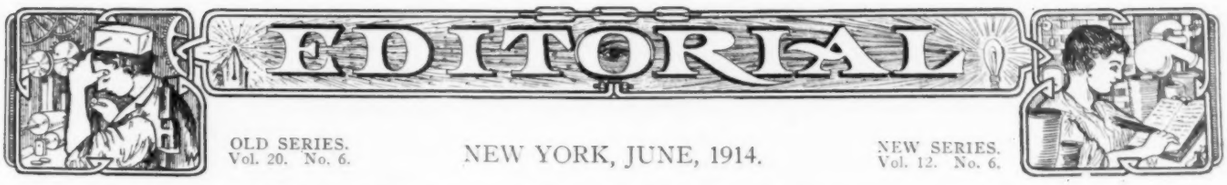
The secondary aluminum produced in 1913 was 2,198 short tons; the quantity of recovered aluminum contained in alloys was 2,456 short tons.

EXPORTS.

The value of exports of aluminum and of manufactures of aluminum of domestic production for the last five years has been as follows:

Exports of aluminum of domestic production, 1909-1913.

1909	$567,375	1912	$1,347,621
1910	949,215	1913	966,094
1911	1,158,603		



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THE METAL INDUSTRY

With Which are Incorporated
THE ALUMINUM WORLD, COPPER AND BRASS,
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AND ELECTRO-PLATERS' REVIEW.

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SCRAP METALS AND HONESTY

The conditions revealed by W. H. Parry in his article on "Buying and Selling of Foundry Refuse" in this issue of THE METAL INDUSTRY we are glad to believe are not general. It is no doubt a fact that the scrap metal business offers peculiar opportunities for sharp practices and that it behooves every one to be on guard whether engaged in either buying or selling. We believe, however, that at the present time there is much less trickery or deception practiced in the scrap metal business than in former years and that it is constantly on the wane. Whether this is due to fear of detection and the consequent resuits or from a voluntary desire of the scrap dealer to turn over a new leaf we are unable to say. One of the contributing causes for the scrap metal man to keep in the path of rectitude is undoubtedly the growing use by concerns of the "conservationist." In up-to-date concerns everything bought and sold in the line of materials either metallic or otherwise is carefully scrutinized and tested until its value is not a problematical figure but a known fact. All of this, of course, has a deterrent effect on the buyer or seller who has fraudulent designs on someone else's bank account through the medium of a dump heap or a waste solution.

It is only a few years ago, we remember, that a merry war was waged between the scrap metal men and mills and shops that wished to buy metal and sell refuse. We recall some such pleasant tricks as treating oily brass chips with the white sand of Long Island Sound and recommending it (the sand) as a good flux, or immersing old gas pipe in copper sulphate solution and disposing of it at a fair price for copper tubing. A remunerative pastime was, as Mr. Parry mentions, to fill the center of a clean new brass "cabbage" with brass plated steel sheet clippings. Another interesting by-play was to purchase the ends of the tinned brass condenser tubes from a tube mill, dissolve off the tin, fill the open end with lead and hammer it shut, then sell it to the small brass founder who wanted some good yellow metal cheap. He got it! "Fine washings," as the material from the brass foundry wash-house is known, came in for its share of attention and was often found mixed in with good, clean drill rod stock chips.

In the days of Auld Lang Syne the gray dust that gathered on the top of the tinning kettle was craftily and condescendingly carried away by the scrap dealer for the sake of taking a chance on the "wee bit-o-tin" there might be in it. It was really not until the chemist came into his own that it was generally known that the "gray dust" held 80 per cent. tin, which is very readily recoverable as metal. The chemical laboratory and the testing

room have wrought really a revolution in the scrap metal business. Nothing is guesswork any more and no "chances" are taken. It is probably for this reason that some few bright stars, who, however, should not be taken as shining examples, have had recourse to the tricks related by Mr. Parry. We hope so at least, for we like to feel that the world is growing better even in regards to our junk heaps.

ELECTRO-PLATERS' CONVENTION

The convention of the American Electro-Platers' Society, held in Chicago June 4 to 6 and described in the opening pages of this issue of THE METAL INDUSTRY, has gone into history but it has left its impression behind it. Just how deep this impression is in the minds of those most interested is best shown, we think, by the following expression from GEORGE B. HOGABOOM, past president of the society. He says:

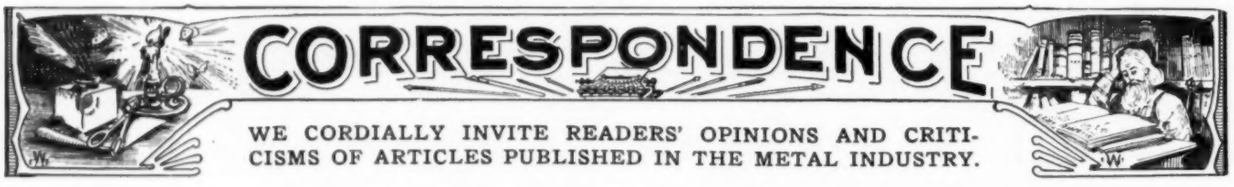
"Success in letters of emblazoned glory must be written on the covers of the proceedings of the convention. Not only was the shell of the plater broken, but it was so jammed with enthusiasm that it burst into pieces as dust and was blown into oblivion.

"Frank good fellowship reigned supreme. With each grasp of the hand came that magnetic feeling of fraternalism.

"The members of the Chicago branch whose hearts are *the largest in the world*, entertained royally, and never will be forgotten their cordial hospitality.

"The society grew in the few days of the convention into the full stature of manhood, and will henceforth demand the recognition which the electroplating industry deserves. In the history of organizations it will stand out boldly as one which has for its object the betterment of its members through education."

Anyone who attended the first meeting of this society at the Hotel Chelsea, New York, March 6, 1909, and then went to Chicago last week must have experienced the same feeling as told above by Mr. HOGABOOM. At the 1909 meeting there were eighteen present, at Chicago, while there were not such a large number present in person, it must be remembered that hundreds were represented by delegates, and the spirit of these hundreds inspired these delegates and this made the success of the meeting certain. A glance at the programme as shown in COL. HANSJOSTEN'S account of the convention will convince one of the sincerity of these men in their self-appointed task to uplift their profession. The American Electro-Platers' Society is now a power in the electroplating industry just as Founder CHARLES H. PROCTOR dreamed it would be, and now takes its place with the scientific societies of the world, whose aims and objects are coincident.



LAKE VS. ELECTROLYTIC COPPER

TO THE EDITOR OF THE METAL INDUSTRY:

In the issue of *Engineering & Mining Journal* of May 9, the following editorial appears:

"We have this week discontinued the daily quotation of the price for Lake copper, whereof our record extends back for nearly half a century. Indeed, it is within but 20 years that daily quotations for electrolytic copper began, and up to that time Lake copper was the criterion of the market. Since then, however, the production of electrolytic copper has far outpaced that of Lake and at the present time the latter constitutes but a small proportion of the total production of American refiners, to be exact, only about one-eighth of the total. That relatively small production is divided into several kinds, realizing rather wide differences in price, and each governed by its peculiar market conditions The result of this has been that during many weeks no sales of Lake copper are reported, and the market has had to be quoted as 'nominal.' Another result is that often the only business that can be reported is of but carload lots, relatively of retail character in comparison with the electrolytic business, which is always a wholesale affair, an average of nearly 5,000,000 daily having to be sold to dispose of the American refinery output. Electrolytic copper has long been the kind of metal that establishes the market and the price, for Lake has ceased to be a matter of steady interest."

In connection with this passing of the quotations of prices for Lake copper, you may perhaps wish to reprint the concluding paragraphs of the last installment of my serial, "Lake Copper Versus Electrolytic," in your issue for May, 1907, page 139, in which I predicted that the prejudice in favor of Lake copper and the discrepancy in price between Lake copper and electrolytic, would eventually disappear. My remarks bearing on the subject were as follows:

"Reverting to a subject broached in the opening chapter—viz., the relative prices of the different grades of copper in the metal market—the explanation of the discount suffered by electrolytic as compared to Lake must be sought in the history of American copper. The earliest record of Lake Superior copper production available is for the year 1845, when the gross product for the year was 24,880 pounds. For years thereafter Lake copper had no competitor, and the annual production steadily increased, until in 1881, the year when the principle of electrolysis was first commercially applied to copper refining, the Lake output was 54,548,909 pounds.

"The early product of the electrolytic refinery proved inferior to Lake copper, and the latter maintained its early prestige with reason on its side. Later on, however, as scientific knowledge advanced, the quality of the electrolytic product improved, and today its purity (and consequently its conductivity) surpasses that of many brands of Lake—a fact now admitted by Lake copper men themselves. In tests of relative tensile strength and ductility, on the other hand, certain brands of Lake have proved superior to the best electrolytic. This superiority has been attributed to the presence of some impurity in the Lake copper, as arsenic, which, though fatal to the conductivity, is known to improve the mechanical properties. If this allegation can be proved true, then the impurity—arsenic or whatever it is—could presumably be deliberately added to pure electrolytic copper to produce a metal of the desired tensile strength and ductility, and Lake copper would be robbed of its last claim to superiority.

"Of the many uses of copper, the most important are electrical. In view of this fact the conductivity question is paramount. According to Addicks, as little as 0.0013 per cent. of arsenic will cut down the conductivity one per cent. A comparative examination of nineteen brands of Lake copper

showed that eleven contained more arsenic than the amount specified; that eight of these had a conductivity less than 99 per cent., and that three had conductivity of 75 per cent. or less. Such facts indicate that sooner or later, when old-time prejudice is overcome, each brand of copper, irrespective of place of origin or mode of production, will be sold on its merits, as determined by the conductivity test."

ANDREW M. FAIRLEE.

Copperhill, Tenn., May 15, 1914.

PLATING EQUIPMENT

TO THE EDITOR OF THE METAL INDUSTRY:

I have read the article in the April edition of THE METAL INDUSTRY on "Modern Plating Equipment and Supplies," by E. S. Thompson, and can only express my surprise that such an article could appear in a journal of your standing. The author's ideas on dynamo design, or even Ohms Law are, to say the least, singular. What authority has he for saying that shunt and series dynamos have had their day? Series dynamos never were any good for plating, shunt dynamos are still sold in very large quantities, and are working very successfully in this country. In fact, used by an intelligent man in conjunction with a shunt regulator or field rheostat their disadvantages are less in some respects than the compound machine. The advantages of separate excitation are obvious and all the information given can be had from any maker's catalogue.

Whoever heard of a compound wound generator necessitating a larger frame than a shunt machine for the same output? The actual ampere turns under full load conditions are the same or as nearly so, as it is practicable to make them. Again the question of heat in the series windings on full load is also purely a question of design, and with proper cross sectional areas and cooling surfaces is an elementary proposition. Further, it is not practicable to maintain a perfectly constant field from no load to an overload, as indicated in the paper. The author's connection between resistance and magnetism needs no comment, as a first year student should know better, but the dictum "that there must be resistance to create magnetism" is really rich.

Also dealing with resistances used in connection with plating baths, the author states that "more than 6 volts will cause trouble in open tank work and if the dynamo is giving a higher voltage at those tanks the current must be cut down on the rheostat which also cuts down the number of amperes slowing down the deposit and giving a very unsatisfactory result."

A short study of the laws which govern these matters would have told the author that with a given applied voltage and a known resistance the current is always the same in every part of the circuit so that the mere fact of using a higher voltage dynamo, and cutting it down at the vat terminals to the required voltage by means of a resistance in series with the vat, gives exactly the same results as if a dynamo of that voltage were being used, it is not possible to reduce the voltage without reducing the current, provided the conditions in the vat remain constant. The author has shown such a lamentable lack of knowledge of the subject from an electrical standpoint that one only hopes that from a plating point of view the information in the next number may be up to date and what is more important, correct.

GEORGE A. POPE.

17 Alexander Road, Acocks Green, London, May 7, 1914.

SIDE LIGHT ON PLATING COSTS

TO THE EDITOR OF THE METAL INDUSTRY:

I do feel moved to write a line of protest in answer to a "Sidelight on Plating Costs," by C. S. Barbour, Jr., in the April issue of your paper.

It is alleged that double nickel salts seldom, if ever, do contain over 9½ per cent. to 10 per cent. of nickel. In the course of my experience, apart from salts of our own manufacture, I have seen analytical tests of practically every make throughout the world, and I have never seen an analysis that varied more than a few decimal points, and I do not very well see how this can be otherwise, as the article could not be produced and sold in the proper crystalline form containing the low percentage of nickel that your correspondent alleges. The only impurity that I have ever come across is a percentage of copper which has been derived from theoretical value, namely, 14.8 per cent. nickel, where it has been difficult to separate the copper and nickel ores, but trouble immediately followed where these have been tried for plating. Another absurdity is to allege that of the total deposit, only 10 per cent. of the anodes is actually deposited on the work, although it is stated that 85 per cent. of the anode is eventually deposited.

I will give you the result of my practical experience of many years. A man works, say, a 4 or 5 foot nickel vat, and puts into it 100 pounds of nickel anodes; we will say nothing about the waste of tops and other scraps, but will take your correspondent's figures that 85 pounds of nickel is deposited. The original lot of nickel anodes will last, taking them ¼ inch thick, a consumer about 12 months. Now, as your correspondent says only "10 per cent. of the nickel deposited actually comes from the anode," it means that 850 pounds of nickel is deposited in 12 months, that means 85 pounds from the anodes and 765 pounds from the salts, but as the salts only contain under 15 per cent. nickel, this means that 5,100 pounds double nickel salts have been consumed in the 12 months. Considering that as an actual fact, this man would only use 28 pounds or, at the most, 56 pounds of double nickel salts during 12 months, the reasoning of your correspondent will not accord with any practical working that has ever come under my experience.

The fact is, this letter has been written on unsound data to push the merits of a particular quick-plating salt. Quick-plating solutions (of which there are several on the market) have come to stay, and, in my opinion, have undoubted advantages in most directions within limits, but to claim advantages by such unsound reasoning as your correspondent, is about the worst possible thing that could be done, particularly when one considers the splendid work that has been and is being done today by the ordinary double sulphate solution, and where comes the necessity to condemn one to push the claims of another?

ERNEST R. CANNING,
W. Canning and Company.

Birmingham, England, May 19, 1914.

TO THE EDITOR OF THE METAL INDUSTRY:

I have carefully read Mr. Barbour's letter in the May number and although I feel that further remarks from me are hardly necessary, it is only fair that I should state that my letter criticizing his article was not intended as personal, as I can disassociate personalities from articles when making a fair criticism. For this reason I will pass over Mr. Barbour's personal references to me and my past efforts, except to say that the attempt made to rack up an old subterfuge will not help. Every plater knows that ordinary double sulphate solutions are of variable character. The density varies, the metal content varies, some contain boric acid and some do not. Mr. Barbour's article condemned a class of solutions and not solutions of specific formula, and my reply was naturally general, and holds as well in the case of ordinary double sulphate as well as those containing other materials. Likewise the introduction of silver plating evidence is of no value in strengthening his case of nickel plating, which alone was criticized. No doubt the reference to impure salts and anodes will bring an adequate reply from the manufacturers of those materials and I for one will state that at least one nickel salt is being sold on the market that is pure.

Inasmuch as my general contentions remain unanswered it is safe to assume that the author cannot justify his statements or substantiate them with facts. Finally, in answer to a question which he asks, I would state that it is not uncommon to find anodes that have become so badly oxidized that they will crumble to pieces before half consumed. This may be **due** to fault in the manufacture of the anodes, but is more **likely due** to the quality of the nickel solution. All cases which the writer has personally looked into can be attributed to the fact that the nickel solution was maintained in such poor condition as to be highly inefficient. Despite this I have never felt justified in condemning all platers and all nickel solutions as inefficient because of a few instances, nor is anyone justified in making a general condemnation on such grounds.

P. S. BROWN.

New York, May 28, 1914.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—Can you give us a good nickel alloy suitable for renewable seats for valves, used for super-heated steam, and also the best method of melting same.

A.—The following mixture can be used:

Nickel	62
Copper	32
Ferro-manganese, 80 per cent	4
Tin	2

This alloy can be melted in a No. 40 crucible in a coke fired furnace with a forced draft.—J. L. J. Problem 1,980.

BRAZING

Q.—I find that well annealed malleable iron cycle and motorcycle lugs, after being brazed on to steel tubing by the usual gas hearth process by experienced men, become extremely brittle. Can you inform me the cause, and any means of prevention?

A.—Malleable iron contains 2 per cent. or more of carbon, and when brazed to the steel tubing that portion of the tubing adjacent to the weld becomes to all intents and purposes a high carbon, brittle steel. By using drop forged steel lugs you would avoid the trouble, although it might perhaps be overcome by using some of the deoxidizing fluxes used for welding cast iron.—J. L. J. Problem 1,981.

CASTING

Q.—What is the allowance necessary for the shrinkage in casting on the following metals: brass, zinc, tin, aluminum, and brittania metals.

A.—For castings where the thickness runs about one inch and cast under ordinary conditions the following allowances can be made:

Brass	3/16 inch per foot.
Zinc	5/16 " " "
Tin	1/16 " " "
Aluminum	3/16 " " "
Britannia	1/32 " " "

Thicker castings under the same conditions will shrink less and thinner ones more than the above standard. The quality of the material and the manner of molding and cooling will also make a difference.—P. W. B. Problem 1,982.

FINISHING

Q.—Would you kindly give me the process that manufacturers of scales use to produce the black finish on their products, and what is the composition of the resist used on pantograph machines?

A.—We are unable to furnish you with the name of the material used by the company you mention. However, a very good material for the purpose is dead black japalac. This will dry very hard, is easily applied with a piece of felt and may be readily removed from the plain surface with a mixture of boiled linseed oil and turpentine. A home-made mixture may also be prepared by dissolving drop or ivory black in one-quarter part turpentine copal varnish and one-half part linseed oil and one part turpentine, producing a material of paint-like consistency. Then apply as above stated.

If the rubber stamp method is used for etching, gum guiacum or the common resin of commerce, dissolved in denatured alcohol, is frequently used. This should be of oily consistency and should be colored with aniline red or violet. The varnish should be filtered so that all sediment is removed. To reduce the varnish rubber stamps are used. Pads are arranged similar to ink pads and these are saturated with a solution of caustic soda. This application eats through the varnish, leaving the etching ground clear. The gums can be readily removed with alcohol, benzine, gasoline or by immersing for a few minutes in warm solution of caustic soda. Other materials used are air-drying Japan or asphaltum varnish. A new material called Mogul has been highly recommended for the purpose.—C. H. P. Problem 1,983.

MELTING

Q.—Will you please enlighten me in regard to cupola results. What effect on the metal has the cupola fire? What condition is the metal in after coming through the cupola? Are any impurities eliminated? This refers only to white metal viz.: metal from newspaper metal drosses. What flux is considered the best to be used in cupolas?

A.—Cupolas are not used in the melting or refining of type or other white metals, so the fire does not come in contact with the metal. Cast iron kettles built in brick is the customary method of melting and paddles operated mechanically and made from iron are used to agitate the metal and bring the drosses to the surface. Lead oxide is principally formed in melting new metal and refining old metals.

Sal ammoniac, mutton or beef tallow and resins are used as oxide reducers. Raw potatoes that cannot be used for any other purpose may be placed in an iron basket and weighted with iron to keep it below the surface of the metal, will prove an excellent cleanser on account of the moisture in the potatoes which produces a steam and eventually a carbon which produces an effective remover of oxides from the metals. After the oxides forming upon the surface of the metal have been removed by skimming the remaining metal is practically pure for all purposes.

The kettles mentioned should be of sufficient size so that each melting does not occupy more than two-thirds the capacity of the kettle.—C. H. P. Problem 1,984.

MIXING

Q.—Kindly answer the following questions:

1. Could you inform me the best mixture for steam valves for superheated steam at a temperature of 600 degs. Fahr.

2. Our present mixture for ordinary steam valves is: Copper, 80 per cent.; tin, 2 per cent.; zinc, 12 per cent., and lead 6 per cent., but we have a very large percentage of porous castings. Could you inform me as to the cause and cure?

3. Some valves are returned from certain districts badly scored and pitted, while others elsewhere seem to do admirably. Is this, as I suspect, caused by the water attacking the zinc?

A.—1. Monel metal has been used for steam valves for superheated steam. It is a difficult metal to handle in the brass foundry, however, being really a steel foundry proposition. Pure nickel packing rings are often used where the valve moves on its seat.

2. In the manufacture of steam valves, there are numerous causes for the production of porous castings.

a. A mixture too high in zinc gives drossy metal and bad castings. An alloy of copper—88 per cent., tin, 10 per cent., zinc, 2 per cent., is free from this defect if properly handled.

b. Soaking the metal in the furnace or overheating it is nearly always the most likely cause of porous castings.

c. The use of skim gates is desirable, as they serve to strain out any dross or dirt in the metal and then tend to aid the production of sound valves.

3. The corroding of the valves is caused by the water attacking the zinc. The water may contain considerable amounts of alkaline chlorides, such as sodium chloride, etc., and such water forms an electrolyte that may attack the valve. The reason why some valves are pitted and others are not is because of imperfect mix-

ing of the metal. The unalloyed copper, tin, lead or zinc forms a galvanic couple and when an electrolyte is present, this results in corrosion. The use of a graphite packing in valves forms a galvanic couple also, and this has been found in some instances to cause corrosion.—J. L. J. Problem 1,985.

POLISHING

Q.—We have been buying our emery wheels of the same diameter from different manufacturers and they specify different speeds to run them at. What is the best speed to adopt to get the best results?

A.—Although there is no exactly defined limit at which a wheel must be run to render it effective, experience has demonstrated that taking into account safety, durability and liability to heat 5,500 feet per minute at the most gives the best results. All first class wheels have the number of revolutions necessary to give this rate marked on their labels. Above this speed all wheels are unsafe. If run much below it the wheels wear away rapidly in proportion to what they accomplish.—P. W. B. Problem 1,986.

Q.—Can you give me the method of handling brass tubing so as to produce a satin finish, such as is used on brass beds?

A.—The method used by brass bedstead manufacturers to produce the satin finish upon brass beds is as follows:

The tubes are roughed out by polishing lengthwise upon sewn buffs or canvas polishing wheels, from two to four inches wide and twelve to eighteen inches in diameter, and run at 1200 revolutions per minute. These wheels are coated with 160 emery by first applying a coating of a first class glue such as used by polishers and then rolling in the emery so that the face of the polishing wheel is evenly coated. A second coat should be applied, if necessary, when the first is perfectly dry. To even down the surface of the wheel use a flint stone that may be picked up most anywhere.

After the outer surface of the tubes have been removed in the manner mentioned, then rub the tubes down with emery and oil using canton flannel or cotton waste for the purpose. Mix the oil and emery together into a paste. The fineness or coarseness of the finish depends upon the emery used. Some use 90 and others use 150. Rub the surface of the tube up and down a few times evenly; then wash the oil from the surface with rags soaked with benzine. Dry with a cloth or maple sawdust and lacquer in the usual manner with a plain or gold colored lacquer applied with a brush or spray.—C. H. P. Problem 1,987.

PLATING

Q.—Can you give me a formula for a good cold gold solution?

A.—Cold gold solutions require very much more gold in solution than hot baths and do not give such rich tones, requiring at least 1 ounce of gold per gallon.

If you desire to prepare a cold gold solution dissolve the gold in a chloride, then precipitate to a fulminate with ammonia and wash carefully to remove all traces of ammonia. Prepare a solution of cyanide and water by adding three ounces of cyanide to the gallon, then add one ounce of gold prepared as above. A few pennyweights of bisulphite of soda may be added to bring up the tone of the gold. You can prepare a solution by using half the amount of gold, but weak cold gold solutions usually produce deposits of a very light color.—C. H. P. Problem 1,988.

REFINING

Q.—We should esteem it a favor if you will kindly say what is the best method of purifying old scrap lead, so as to make it soft like virgin lead.

A.—Old scrap lead, if very drossy, may be utilized by feeding it gradually into a pot half full of lead that has been raised to a red heat. After the kettle is nearly full, boil up with a stick of hickory or other hard wood, skim and pour into ingots. The oxide or dust from the kettle can only be reduced at a high temperature in blast or reverberatory furnaces.

If the old scrap lead contains antimony it may be purified in a similar manner and the resulting hard lead used for making babbitt. Only soft lead can be used for solder.—J. L. J. Problem 1,989.

ROLLING

Q.—We would like to know how nickel is made malleable enough to roll. Any information on this subject will be greatly appreciated.

A.—To render nickel sufficiently malleable to roll the process of Fleitmann is used. This consists in fusing the nickel in a clay crucible and adding to it ⅛ to 1/20 per cent. of metallic magnesium. This addition of magnesium is supposed to remove nickel cyanide and carbon monoxide and render the nickel capable of being rolled into thin sheets.—J. L. J. Problem 1,990.

SILVERING

Q.—We are manufacturing large quantities of copper headlight reflectors which are silver-plated on the inside only. Although we have applied to every plating supply dealer we know of, we have been unable to find a stop-off varnish to prevent deposition of silver on the outside of the reflector. The varnish must be able to resist the hot water bath as well as the cyanide solution.

A.—Dissolve gum copal in acetone until a varnish of the desired consistency is obtained. Color black with nigrosine or red or blue with aniline dyes. This varnish requires a strong hot potash to remove, should resist any cyanide of silver solution and the reflective surface should be cleansed with sponges instead of immersion in potash.—C. H. P. Problem 1,991.

SOLDERING

Q. I should be pleased if you would kindly give me the name of the solder used in soldering aluminum and also the kind of flux used with same.

A.—To solder aluminum to aluminum use the following:

Tin	69	parts.
Zinc	25	"
Aluminum	6	"

To solder aluminum to other metals (copper, brass, etc.) use the following:

Tin	88	parts.
Zinc	12	"

J. L. J. Problem 1,992.

STRIPPING

Q.—Can you give me a strip for nickel on brass mesh baskets and brass racks?

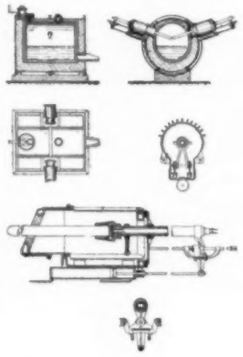
A.—Unless you strip the nickel from your racks and baskets every day it is impossible to obtain an acid strip to remove the nickel. Platers who have been doing nickel-plating for years find that the most satisfactory method to remove the excess of nickel from racks and baskets is, that when they have been coated with quite a thickness to obtain an iron block of sufficient size and a round headed hammer and crack the nickel off by hammering. You will find that it is not difficult to remove the nickel in this way. Again you will find that when you plate articles from a basket that the nickel has been removed without the use of acids the deposit is considerably whiter. In stripping off the nickel with acids there is frequent trouble due to the generation of an excess of oxygen that has a tendency to show up in the work. Some platers make up their baskets by using wood for the sides and ends and coating these before using with an asphaltum varnish, leaving the bottom uncoated and using a wire mesh for conductive purposes for the articles to be plated. In a like manner frames are coated excepting the hooks which are necessary to have uncoated to support the articles. Of course such frames and baskets when coated in the manner mentioned can not be immersed in hot potash solutions. It is advisable to cleanse the work previously to placing in these baskets and use them for plating only.—C. H. P. Problem, 1,993.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

1,093,494. April 14, 1914. **Electric Furnace for Medium Temperatures Particularly for Melting Copper and Its Alloys.** Ernesto Stassano, of Turin, Italy, and Napoleon Petinot, of Niagara Falls, New York.

This invention relates to electric furnaces or medium temperatures particularly for melting copper and its alloys, the main new features of which are the shape and construction of the melting chamber as well as the shape and construction of the electrode-holders and an air-lock hopper which permits the charging of the material to be melted without allowing communication between the melting chamber and the atmosphere outside of the furnace.



The furnace is of the well-known type, as shown in cut, which heats the charge by radiation from an electric arc formed between two electrodes, situated above the charge, as well as by the reflected heat from the roof or that part of the furnace above the charge. The inventors have overcome certain serious objects to small furnaces of this type, which have been heretofore described. First, there is a rapid destruction of the lining of the furnace in all of the parts not covered by the charge and which are, therefore, exposed to the intense heat radiated from the arc. Second, there are serious heat losses through the lining where this is covered by the charge. In this invention, however, provision is made to receive a maximum heat circulation in the parts protected from the direct radiation of the arc. There is also a sufficiently low heat insulation provided for at the places exposed to the direct radiation in order to prevent the rapid destruction of the refractory lining. Moreover, for certain purposes, especially the melting of the alloys of copper, it is important to have the furnace used for the purpose perfectly air-tight, and the inventors have accordingly in combination with the furnace improved the forms of electrode holders and charging device.

1,093,557. April 14, 1914. **Alloy.** Edward D. Gleason, of New York, N. Y., assignor, by Mesne Assignments, to Neu-Metals and Process Company, of Long Island City, New York.

It is the ultimate object of this invention to provide boiler and condenser tubes of homogeneous metal capable of resisting corrosion, but my improved alloy is not only capable of resisting the corrosive action of water and steam, but is also capable of resisting the action of sulphuric and nitric acids and other corrosive liquids, and consequently may be employed for other structures than such tubes. Said alloy is about the color of platinum and has a coefficient of expansion, by heat, approximately that of glass. The inventor finds that the useful properties aforesaid are characteristic of alloys within the following range of proportions by weight:

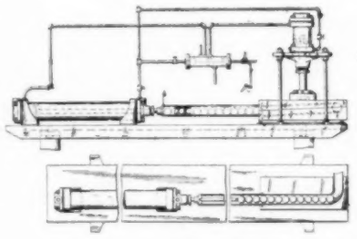
Iron	80 to 120 parts
Nickel	80 to 120 parts
Copper	1 part
Aluminum	4 parts

He finds it preferable to employ Swedish iron in making such alloys and a typical example, having the useful properties above stated, is as follows:

Swedish iron	110 parts
Nickel	90 parts
Copper	1 part
Aluminum	4 parts

1,095,265. May 5, 1914. **Tube Finishing Machine.** L. H. Brinkman, Glen Ridge, N. J. Assignor to Baltimore Tube Company, Baltimore, Md.

This invention relates to tube finishing machines, and more particularly to machines for smoothing out any irregularities or unevenness in the shell of a tube which has previously been bent to approximately the shape desired, in order to give the tube a smooth, uniform bore and to conform it exactly to the shape desired.

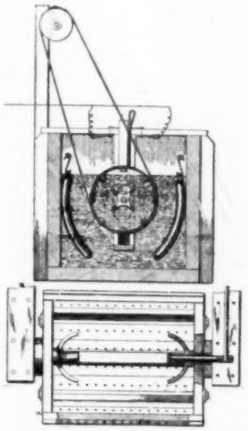


One object of the invention is to provide a simple and durable machine of the type shown in cut, by means of which tubes may be rapidly finished.

Another object of the invention is to provide such a machine which may be readily controlled and operated with little effort on the part of the attendant, and still another object of the invention is to provide a fluid pressure-operated machine of the above type having a single control valve by means of which the machine may be readily controlled and rapidly operated by a single attendant.

1,095,328. May 5, 1914. **Plating Apparatus.** J. H. Jordan, St. Louis, Mo.

This invention relates to a plating apparatus of the type in which metallic articles are plated with brass or copper or nickel or other suitable plating materials, and in which the plating material is transferred and applied to and upon the articles to be plated while submerged in liquid, by the action of an electric current.



An object of the invention is to provide an improved apparatus, as shown in cut, for plating various articles and objects, comprising a tank or vat arranged to contain a liquid in which the anodes are submerged, in combination with a movable support for holding the articles to be plated submerged in the liquid in the tank or vat, and means for moving the articles to be plated, while subjecting the anodes and the articles to the action of an electric current.

Another object of the invention is to provide an apparatus for the purpose mentioned comprising a tank or vat in which the anodes are submerged, a revolving drum or barrel adapted to contain the articles to be plated, and means for moving (rotating, in the present instance) the drum or barrel while constantly subjecting the anodes and the articles to be plated to the action of an electric current. The drum or barrel may be removed from one tank or vat to others of different sizes, and containing different solutions.

1,095,357. May 5, 1914. **Process for the Production of Varied Colorations and Black Shades on Metals.** Francois Auguste Roux, of Paris, France. Assignor to Société L'Aluminium Francais, of Paris, France.

When it is required to deposit on metals thin colored or black layers, sulphurizing or oxidizing substances are generally employed. This operation, which gives more or less good results with the metals of which the oxides or sulphides are colored, is inapplicable to aluminum, of which the oxide and sulphide are white.

The present invention has for its object a process of producing, especially upon aluminum, the above named colored or black deposits, by the use of an electrolyte that is constituted by a more or less diluted solution of ammonium-molybdate. The metal to be treated is arranged in the electrolytic solution as the cathode, the anode being constituted either by a sheet of platinum or any other metal that is insoluble in the electrolyte, or by a plate of carbon. To the solution of molybdate there may be added a certain amount of ammonium, in order to facilitate the formation of the colored deposit, which gradually passing through all the colors of the spectrum reaches absolute black. This process is applicable not only to aluminum, but to all usual metals. In this latter case it is often advantageous to add to the bath a cyanide or another alkaline salt.

The following is an example of the composition of the bath: Water, 1,000 grams; ammonium-molybdate, 25 grams; ammonium, 10 cubic centimeters. It is to be observed that these proportions are not wholly absolute and may be varied on a large scale in order to obtain more or less quickly the desired result.

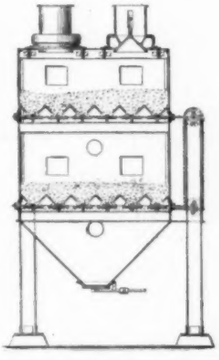
1,095,653. May 5, 1914. **Aluminum Alloy and Method of Producing It.** W. A. McAdams, Bay Shore, N. Y.

This invention consists in an aluminum alloy and in the method of producing the same, the said alloy comprising a novel combination of materials in novel proportions, producing a composition of matter especially well adapted for casting under pressure in die-casting machines, said composition being very strong and resonant and having a permanent superior luster.

The alloy is composed of aluminum, zinc, copper and antimony combined in substantially the following proportions by weight: aluminum seventy parts, zinc twenty-two parts, copper three parts, and antimony five parts.

1,095,676. May 5, 1914. **Filtration of Flue-Dust, Fume and Like Fine Solid Impurities from Furnace-Gases.** Gilbert Rigg, of Palmerton, Pennsylvania. Assignor to New Jersey Zinc Company, of New York, N. Y., a corporation of New Jersey.

This invention relates to the arresting and filtering out from the gases of metallurgical furnaces of the fine solid impurities, sometimes designated as flue dust and fume, comprising products resulting from the conversion of a vapor into a solid in suspension in a gas, and sometimes accompanied by considerable percentages of other solids in such a fine condition of mechanical sub-division as to be practically indistinguishable from a fume.



Among the substances whose filtration from gases is contemplated by the invention may be specified, for instance, blue powder, consisting of zinc vapor converted, on cooling, into extremely finely divided metallic zinc; also vapors of zinc, lead, and manganese, undergoing oxidization and giving rise to fumes consisting of the oxides of those metals.

For effecting the filtration of gases containing these finely divided solid impurities, the inventor makes use of a body of relatively coarse material, as shown in cut, such as small anthracite coal, coke, gravel, spiegel slag, oxide furnace cinder, broken stone, broken fire brick, or the like, preferably employing such sizes as will pass through a screen of one-half inch mesh and be retained upon a screen of one-quarter inch mesh.

1,095,804. May 5, 1914. **Process of Hardening Copper Alloys Containing a Small Amount of Tin.** Henry Bryda, Blackstone, Mass.

The present invention relates to a method of treating copper alloys, and has special reference to the treatment of alloys containing copper, together with a small amount of tin, for hardening the same.

The process may be used in treating table knives or forks, and similar articles, in order to harden them sufficiently for such uses.

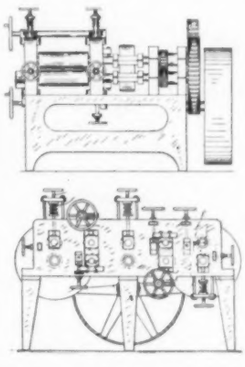
The metal to be hardened, for example, just after casting and as soon as the metal has solidified is first treated by filing or otherwise grinding the surface, or a portion of the surface, to render the same smooth and shiny, and also to give the necessary cutting edge. The metal or alloy is then taken, and while it is still very hot is placed upon a layer of loam, such a loam as may be obtained from a dry cellar, and which has never been exposed to either sun or rain, being found to be suitable. The loam preferably employed in this process contains an unusually large percentage of sand, which is very fine.

1,097,354. May 19, 1914. **Device for Protecting the Legs and Feet of Workman from Injury by Molten Metal.** Alexander Outerbridge, Jr., Philadelphia, Pa.

This patent covers the device shown in cut for protecting the human leg and foot from injury by hot metal; which device consists of an envelop having a leg portion and a foot portion, composed of formally-durable and non-detaining material, said foot portion being extended to form a shield overlapping substantially the entire upper edge of the sole of a normal shoe corresponding to the dimensions of the leg portion, and said leg and foot portions having a vertically flush surface and substantially uninterrupted downward incline; in combination with fastening means, non-projecting in a horizontal direction.

1,097,976. May 26, 1914. **Metal Scalping Machine.** Alexander Henderson, of Detroit, Mich. Assignor to Detroit Copper and Brass Rolling Mills, of Detroit, a corporation of Michigan.

This invention relates to machines for scalping metal bars, slabs, castings or the like, so as to remove from the faces thereof scaly or foreign substances. Thus when a casting comes from the mold the faces of the casting usually have a certain amount of sand or other impurities that are slightly embedded in the metal and unless these impurities are removed they will be worked into the metal, which would be very objectionable.



The invention therefore has among the objects thereof to provide a machine, shown in cut, which will efficiently scalp the metal castings or the like; to provide a structure by which opposite faces of the bars, slabs or castings will be completely scalped as they pass through the machine, and to provide a machine which may be easily and quickly adapted for various sizes of castings, etc.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

NEW OSBORN AIR SQUEEZERS

JOLT SQUEEZER, STRIPPING SQUEEZER, STRIPPING JOLT SQUEEZER AND SAND-STRADDLER ADDED TO THE LINE.

The Osborn line of portable air squeezers continues to grow. The two larger sizes have for some time been furnished either as plain power squeezers (Nos. 75 and 76) or as power squeezers with jolt equipment added (Nos. 75 J and 76 J), and now the line is broadened still further. Both the plain machine and the jolt squeezer can be had with a stripping mechanism, this device being supplied with any of the

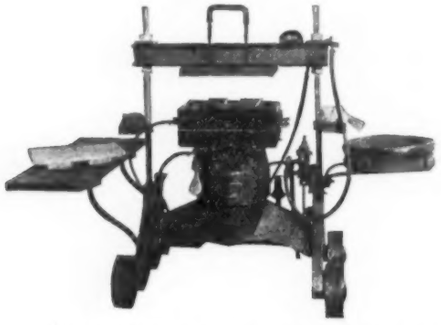


FIG. 1. OSBORN PORTABLE AIR SQUEEZER NO. 75 (THE MEDIUM SIZE).

This is the basic machine of the line.

three sizes. The air squeezer, which is the foundation of this machine series (three sizes), is marked by its notable ease of operation (being automatic in its application of power to the squeeze), the full protection of every working part against dirt and dust, its rugged strength and its simplicity. In the jolt squeezer (two sizes) there is a further advantage, of great value in many classes of work, in that a few jolts before squeezing prevent ram-offs and defective molds, eliminate tucking and also speed up production.

Now a stripping attachment is regularly supplied, when desired, with either the squeezer or the jolt-squeezer type.

FIG. 2. OSBORN PORTABLE AIR SQUEEZER JOLT NO. 75 J (THE MEDIUM SIZE).

This is the No. 75 machine with jolt equipment added.

Its advantages are obvious, as the stripping device operates automatically and gives a true, accurate draw without the employment of skilled labor—a more accurate draw, in fact, than the most skilled operator can produce by hand. The stripping operation is entirely automatic, but can be worked by hand without making any adjustments or changes whatever in the machine. It can be used either with or without stripping plates. The flask-lifting pins are adjustable in and out, and also up and down, and are so located that adjustments can be made for any of a wide range of sizes up to the maximum flask capacity of the squeezer. Any desired depth of draw can be secured.

FIG. 3. OSBORN PORTABLE AIR SQUEEZER STRIPPER NO. 75 S (THE MEDIUM SIZE).

This is the No. 75 machine with stripping equipment added.

Another addition to the Osborn air squeezer line is the making of the small machine (No. 74, 8½-inch cylinder, 30 inches between rods) as a sand-straddler with wide-apart legs, which increase the practical usefulness of the portable feature of the machine. Full information about all the

FIG. 4. OSBORN PORTABLE JOLT STRIPPER AIR SQUEEZER NO. 75 JS (THE MEDIUM SIZE).

This is the No. 75 machine with both jolt and stripping equipment added.

Osborn air squeezers will be supplied to anyone who inquires by the Osborn Manufacturing Company, Cleveland, Ohio.

MANGANESE BRONZE ALLOY

A new alloy has been introduced by the Eisen und Stahlwerk, "Mark," Wengern-Ruhr, Germany, for use in connection with the manufacture of manganese bronze. This alloy, which has been called "Manfecual," is composed of 55 parts of copper, 25 parts of manganese and 2 parts of aluminum and owing to the fact that only especially refined raw materials are used in its manufacture, the alloy is nearly chemically pure and free from impurities. It is said by the manufacturers

that the difficulty which founders have had heretofore in introducing the iron homogenously alloyed into manganese bronzes is now easily overcome.

It is reported that some of the biggest European ship building firms are already using this material, while others are still carrying on trials and it is claimed, that some of these trials show that the alloy is far superior in its effects to other agents, such as ferro-manganese, manganese-copper and manganese metal, especially as with regards to elongation and elastic limit. It is recommended that the alloy be used as follows: The copper is first melted, then about 1 per cent. of aluminum is added, after which the "Manfecual" is introduced. Further information regarding this material may be obtained by addressing the manufacturers as above.

NEW MECHANICAL ANNEALING FURNACE

For over five years Vaughan Hughes, of Birmingham, England, has dispensed with iron retorts in his muffles for bright annealing metals with excellent results in daily practice since. In a paper read in March, 1911, before the Birmingham section of the "Institute of Metals" an attempt was made by the inventor to demonstrate the furnace conditions necessary to ensure the proper heat treatment of metals. In subsequent discussions on papers on furnace construction, he has laid stress on the replacement of iron by suitably designed fire-brick retort chambers.

The illustration Fig. 1 shows two designs of several furnaces the inventor has supplied to his clients. The producers are placed either underground or above ground, according to the exigencies of the site. As gas heating permits of the easy attainments of even temperature regulation, the generators are designed to gasify coke or a mixture of coke and non-bituminous fuel. They are usually attached to the furnace so that the available heat in the gases shall be utilized without loss in transit through long culverts.

Of course, when batteries of producers exist, the gas from these can be, and is, utilized in some works where his furnaces are erected. Mr. Hughes' opinion on this point is that heat treatment should be independent of variation in gas supply, such as generally obtains when a battery of gas producers feed, through one or more mains, several furnaces. Usually manufacturers will not outlay sufficiently for standbys or for provision of a margin to meet leakages in the culvert mains and cracks in improperly constructed gas furnaces. Unfortunately these are of more frequent occurrence than is generally believed, much to the detriment of progress in gas heating.

From the illustration the readers will gather that the gas is let into a flue or flues running the whole length of the furnace. At intervals it is led off through ports into the combustion chambers wherein it meets with its quantum of previously heated air for full combustion. The intensely hot gases are led through separate and specially constructed flues around the muffles or retort chambers, in alternatively opposite directions, giving up their heat to the thin walls of the chamber and delivering further residual heat to the secondary air for combustion entering through recuperators placed generally under the combustion chamber, over top and around the furnace walls. This feature is peculiar to the Vaughan Hughes designs, each ring of the circulating flue is independent and made specially gas-tight in respect of its neighbor. Any form of construction depending on covered clay joints and slabs are said by Mr. Hughes to be doomed to failure in practice.

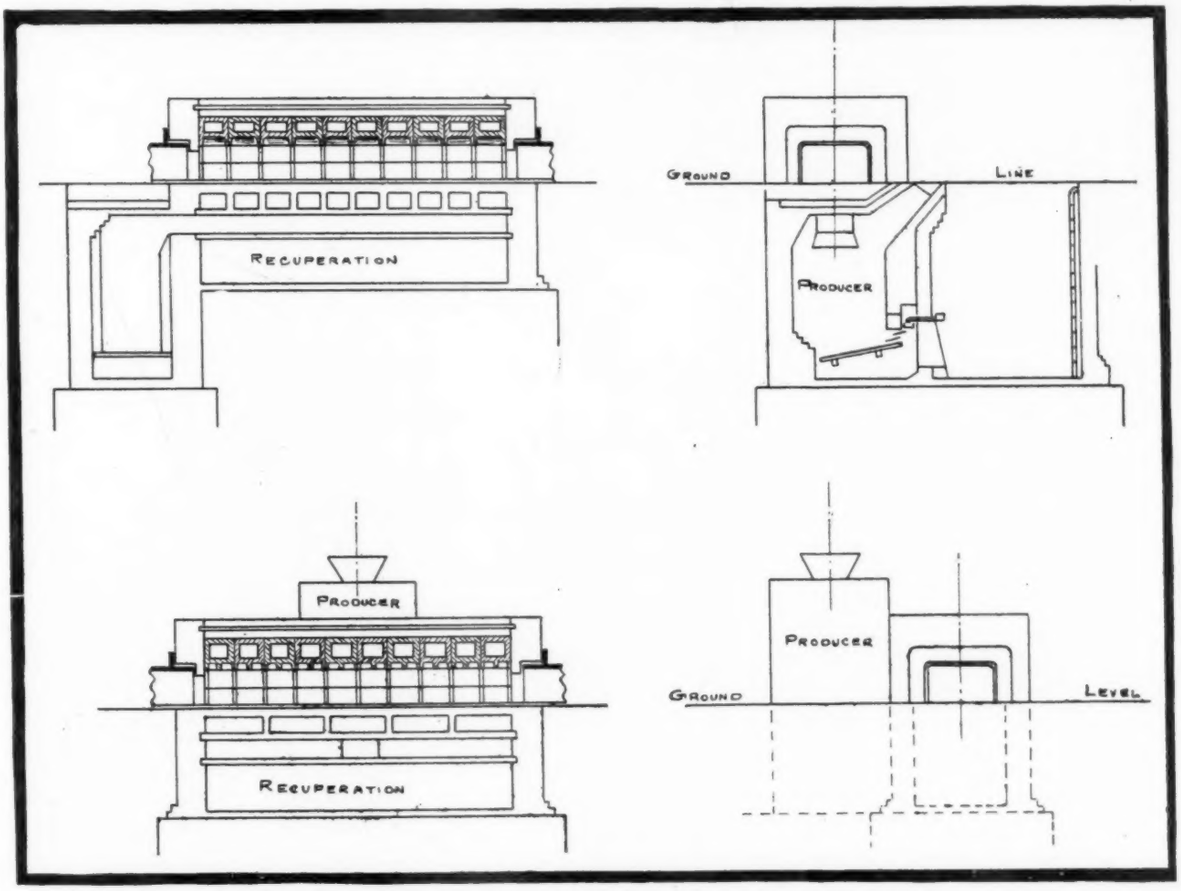


FIG. 1. PLAN VIEW OF VAUGHAN HUGHES METAL ANNEALING FURNACE.

The producer sunk below ground is the form adopted now for many years past in the firing of brass furnaces on the Continent and in batteries of retorts for town-gas production throughout the world. The producer above ground is generally supplied with air or steam blast which lends itself to speedy production of a gaseous fuel of proper quality and to easy stoking without actually suspending the gas supply. The Vaughan Hughes furnaces are designed and built to withstand strains incidental to heating appliances. Obviously by substituting thin linings of fire-brick and employing red brick for the outside casings the prime cost can be made to

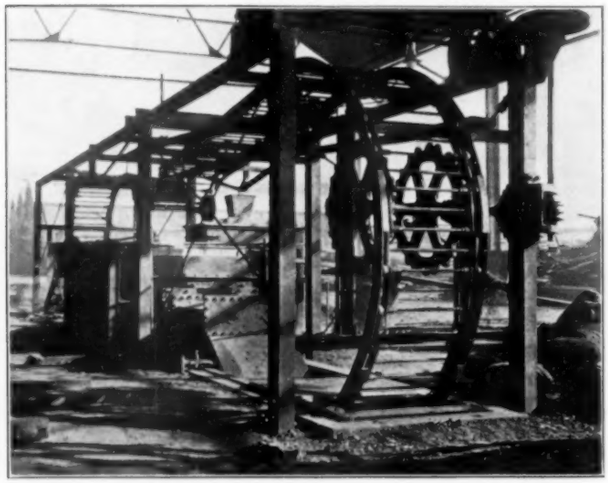


FIG. 2. FRAMEWORK OF A CONTINUOUS ANNEALING MACHINE WITH AN OUTPUT OF 12 CWT. PER HOUR.

suit the taste of purchasers. But there is a limit to this practice for thermal reasons.

The recuperators over the top, sides and bottom of the furnace insures that the air is heated to as high a temperature as is possible without recourse to the more expensive regenerators of the Siemen's type, which generally cost two-thirds of the price of the furnace for which they may be designed. The cut Fig. 2 illustrates a continuous annealing machine having an output of 10-12 cwt. per hour.

As the designs of Mr. Vaughn Hughes are the subject of many patents and have been in service for some years now, working day and night without repairs to the muffle chambers, manufacturers contemplating new equipments or alterations of their existing plant will find it to their greatest advantage to correspond with Mr. Hughes or his agents. All enquiries likely to conduce to business will be cheerfully welcomed by the inventor and those associated with him, at his address, 130 Edmund street, Birmingham, England.

NEW "COSLETTIZING"

The Coslett Anti-Rust Syndicate, Ltd., of Birmingham, England, have recently introduced a lustrous black finish for iron or steel which it is said, has created quite a sensation in England on account of its numerous possibilities. The Coslett process, which has been described in THE METAL INDUSTRY,* is extremely simple to manipulate. All that is required is a rectangular welded steel tank for containing the process solution, and a smaller tank for holding boiling water of about one-half the size. The vats may be heated either by means of coal, coke or gas fires underneath, or steam coils. The solution must be kept boiling during operations. Articles intended for treatment are immersed in the boiling solution for about 2½ hours, then withdrawn, rinsed in boiling water, dried rapidly, brushed and oiled. This completes the whole process. The cost of chemicals, which are phosphoric acid and iron filings for renewing strength of solution is very small, about 90c. daily for renewing a 400 gallon vat, and three operations can be conducted daily.

This process, as has been announced before, is completely covered by patents, both in this country and abroad, and is worked under a license which is granted to manufacturers who pay an annual fee in accordance with the tank capacity used. The cost of the license varies from $50 to $500 annually. The Coslett Anti-Rust Syndicate, Ltd., Temple Row, Birmingham, England, will be glad to answer any inquiries relating to the process.

*THE METAL INDUSTRY, May, 1911.

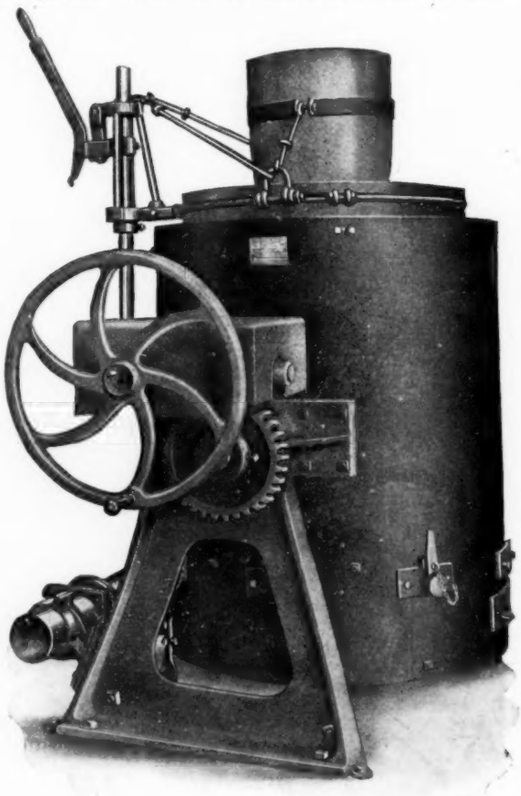
MONARCH FURNACE TESTS

Some interesting tests have been recently conducted with the Monarch coke fired tilting metal melting furnace. The furnace used is the one shown in cut and is manufactured by The Monarch Engineering and Manufacturing Company, of Baltimore, Md. The tests follow:

In a letter to the Monarch company Captain H. F. Jones, commandant and superintendent of the Naval gun factory, reports on a test made on this furnace at Washington Navy Yard. He says:

"On March 10, 1914, there were tests made of the Monarch coke fired tilting furnaces. There was but one heat run in each furnace. The furnaces showed up very well. The fan was hot, however, while making the required number of revolutions as specified in contract. This did not seem to affect the melting of the metal very much; the metal came down very hot. There was no temperature test made.

"From March 14 to March 26 the Monarch furnaces were used to melt finals for the steel. The metal was brought down hotter and in as good time as in the pit furnaces. Your furnaces have some very good points. The tops have an arrangement to make it possible to lift the top and swing it around out of the



MONARCH COKE-FIRED TILTING METAL MELTING FURNACE.

way while charging the furnace. This is very convenient in charging fuel and metal making it possible to charge quicker, and the furnace mandis not subject to the gases or such heat as in other furnaces of this type.

"As to the pounds of metal melted per pound of fuel consumed, it would not be fair to you to limit to the figures given as your furnaces were not run to their full capacity. In figuring these

quantities, the figures are on but one heat as that was the limit of heats run at one time."

An operating report on a No. 275 Monarch tilting crucible coke furnace at Haskell-Barker Car Company's plant, Michigan City, Ind., February 28, 1914, is as follows:

Heat No.		Time.
1—Blast on	6:50 a. m.	
Charged.....625 lbs.	7:20 a. m.	1 hr. 50 min.
Out	8:40 a. m.	
2—Charged.....625 lbs.	8:55 a. m.	
Out	10:15 a. m.	1 hr. 20 min.
3—Charged.....625 lbs.	10:35 a. m.	
Out	11:45 a. m.	1 hr. 10 min.
4—Charged.....625 lbs.	12:10 p. m.	
Out	1:10 p. m.	1 hr.
5—Charged.....625 lbs.	1:30 p. m.	
Out	2:35 p. m.	1 hr. 5 min.
6—Charged.....625 lbs.	2:50 p. m.	
Out	4:00 p. m.	1 hr. 10 min.

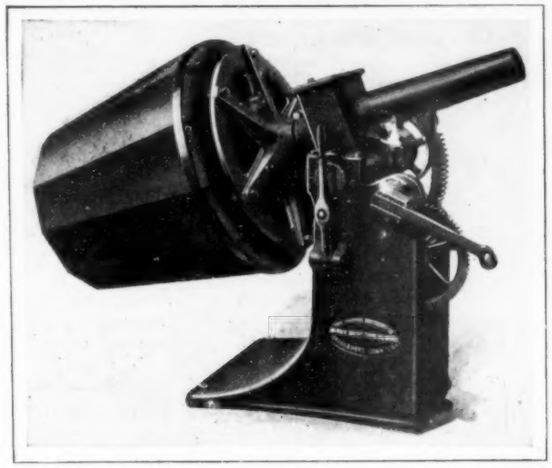
Six heats metal charged 3,750 pounds. Total time, 7 hours 35 minutes. Weight of coke used, 911 pounds. (72 hours Connellsville.)

Another interesting report comes from E. R. Caldwell & Son Brass Company, Syracuse, in regard to operating Monarch No. 150 tilting coke furnace. They are averaging each melt 500 pounds of metal, including a few chips and using 75 pounds of coke, melting in 65 minutes, obtaining six heats per day, and the pots are melting from 51 to 61 heats each and have gone as high as 63 heats. Information regarding these furnaces and their performances will be gladly furnished by the Monarch Engineering and Manufacturing Company, of Baltimore, Md.

SILENT TILTING TUMBLING BARREL

The engineering department of the Warner Brothers Company, Bridgeport, Conn., has placed on the market a machine known as the silent tilting tumbling barrel. It is designed for polishing and grinding small stampings, forgings or castings, and for the wet or dry rolling of plated stampings, which latter process is fast replacing hand burnishing.

The barrel can be tilted to run at any angle between the position shown in the accompanying cut and one at an angle of 180 degs. from it. A slight pull of the crank handle dis-



VIEW OF THE OPERATING SIDE OF THE BARREL SHOWING IT IN THE LOWEST POSITION.

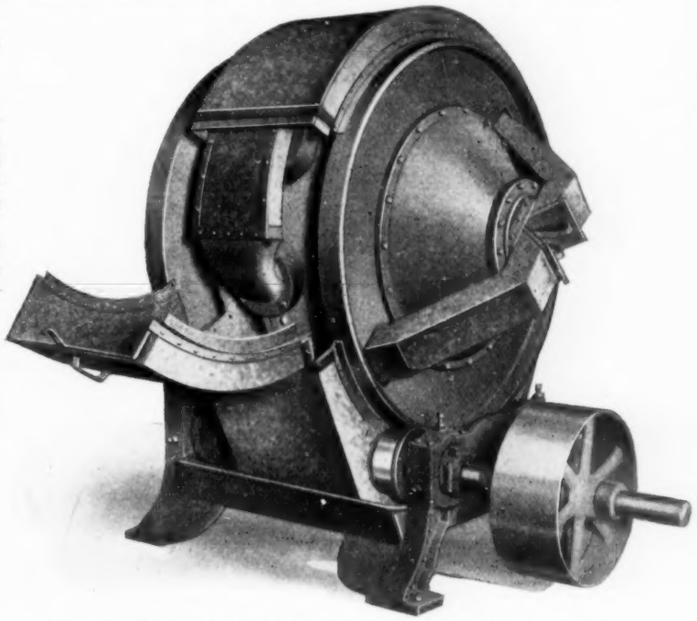
engages the pawl, and a moderate effort of one hand tilts the barrel. When the handle is released the pawl automatically locks itself, and it is emphasized that in this way no accident can result from a flying handle, nor can a falling tub spill its contents on the floor. No gears are exposed, and the workman is protected against accidents. The load of the barrel is carried by a ball thrust bearing.

The machine is driven by a single pulley, which has an internal expanding friction clutch. This clutch is operated by a lever located close to the tilting crank that controls the barrel, thus giving the operator control of all the mechanism of the barrel from one working position. The power is transmitted through a case-hardened steel worm and a cast-iron gear running in an oil bath, which is relied upon to insure silent running. The moving parts are inclosed in dust-tight housings, and this construction with the resulting elimination of dust and grit in conjunction with the silent running tends to reduce the wear to a minimum. The barrel is self-oiling throughout.

Two types of barrels are furnished. A cast-iron or brass barrel of polygon shape is substituted for a steel one in grinding and polishing stampings, forgings or castings. Maple barrels are used for the wet or dry rolling of plated stampings and similar work. Three sizes of barrel are made, having inside diameters of 28, 32 and 36 inches at the bottom, and 23, 27 and 30 inches at the top. The length of barrels are 26, 28 and 30 inches. The barrel having the smallest dimensions is considered the standard size by the maker.

IDEAL CRUSHER AND PULVERIZER

The O. J. Moussette Company, Inc., of Driggs avenue and North Tenth street, Brooklyn, N. Y., inventors and sole manufacturers of the Monarch crusher and cinder mill, which is being operated very successfully by metal founders throughout the United States and Europe, have just completed and placed upon the market their new Ideal Crusher and Pulverizer shown in the cut. Gold and silver refiners



THE MOUSSETTE MONARCH CRUSHER AND CINDER MILL.

have long felt the want of a machine to do away with crushing and screening in separate operations and will readily recognize the advantages of this machine, it is said, which will crush, pulverize and screen the material in one operation, doing away with the great annoyance and extra labor of taking the material from the grinder and screening separately.

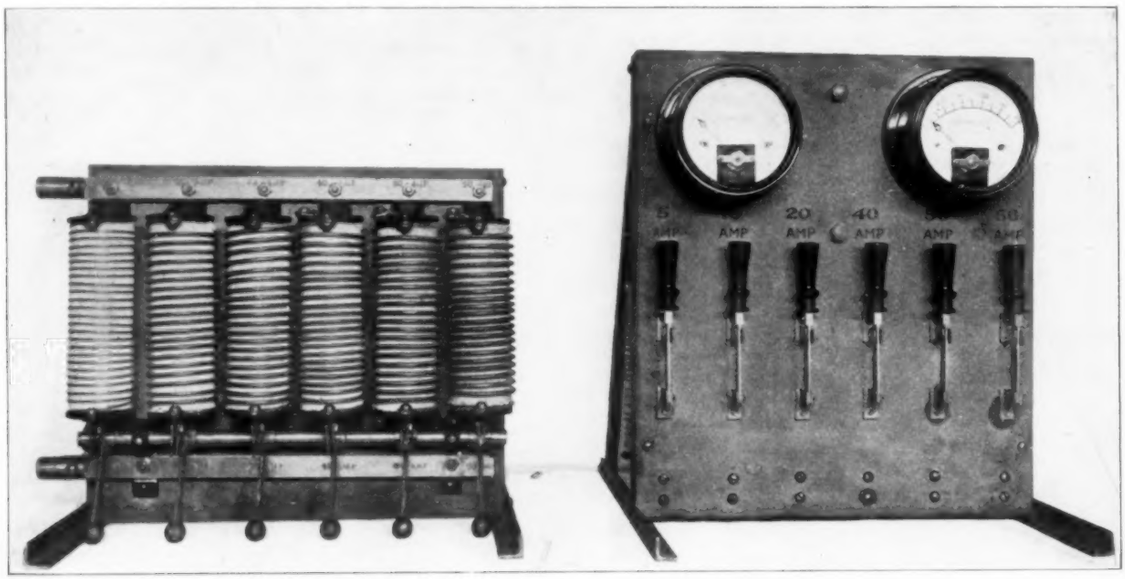
The Ideal crusher and pulverizer is equipped with two sets of screens. The very coarse material is held in the crusher by a grating, through which the finer material passes to a protecting screen made of perforated steel, allowing only the very light material to pass out over the fine screen, which can be made of any desired mesh. The material too coarse to pass out over the screens is automatically returned to the crusher to be re-ground. Provision is made for thoroughly discharging every particle of metal, nails, etc., so that the machine is clean for the next batch or lot of material.

This machine, like the Monarch cinder mill, is built very

heavy and strong and is equipped with the Moussette patented hard steel crushing cones and patented hard steel linings. The operation is simple and although the consumption of power is very small the efficiency is claimed to be great and a surprising amount of work can be turned out in a day. This crusher is built in five different sizes with capacities to suit any requirement. Ask for circular M. I. Circulars will also be sent on request of the new Moussette rotary mixer, shown elsewhere in this issue.

NEW TANK RHEOSTAT

There has recently been placed on the market a tank rheostat for controlling and regulating the current in plating tanks, which differs somewhat from the rheostats in use at the present time as shown by the cut. This rheostat, it is said, has many good features for the fact that any number of steps of control can be obtained by manipulating the series of switches as shown in the accompanying cut. The number of steps of regulation vary from 20 to 35, according to the size of the rheostat. In the smaller sizes the regulation can be obtained in 5 ampere divisions, while in the larger rheostats, the steps will be larger in proportion to the size. The advantages of this rheostat are fine regulations with a large number of divisions, thereby enabling the operator to control his current as well as the voltage in the tank to any desired degree, thereby avoiding the burning or blistering of the work. This rheostat is especially desirable for black nickel and silver, where close regulation is required, but is equally as useful for any other solution used in the deposition of metals. It can be furnished in any size from 50 ampere up to 1,000 ampere or larger. The rheostat is indestructible and impossible to burn out. It can be connected across the full voltage of the dynamo without injury.



THE CROWN RHEOSTAT AND SUPPLY COMPANY'S NEW TANK RHEOSTAT.

The Crown Rheostat and Supply Company, Chicago, Ill., who manufacture the rheostat, are also placing on the market a complete panel board comprising the rheostat, volt and ammeter complete for individual tanks, as shown by the cut which have the same features as the rheostat described above and with the same current and voltage regulation, which makes it a very desirable unit for individual tanks. These are also furnished in any size desired. The tank rheostat is the invention of S. E. Huenerfauth, the well known mechanical engineer, who has for many years specialized on plating equipment.

ZI-LED RUST PROOFING PROCESS

A new process for the purpose of protecting iron and steel from rust has been developed by Louis Schulte, Chicago, Ill., and is being demonstrated and put on the market by the Ele Kem Company, 122 South Michigan avenue, Chicago, Ill. This process has been developed by Mr. Schulte after a great many years of experiment, and is known as the Zi-Led Rust Roofing Process. The process consists of a combination of zinc and lead plating on the iron or steel and, it is said, withstands the test that would break down either zinc or lead alone. The zinc is first deposited electrolytically on the article to be coated and then the lead deposited on top of the zinc. This test enables the material to withstand all atmospheric conditions.

Zi-Led can be deposited on any metal except aluminum, and to any desired thickness. A satisfactory commercial coating is obtained in about the same length of time as the present cold galvanizing process. The cost of applying the process is very little more than that of hot galvanizing, while the cost of installing a plant to do the work is very much less.

Zi-Led can be applied to sheets, rods, tubes, wires, wire cloth or manufactured articles of any kind. Steel springs and spring wire can be coated with the Schulte process and electroplated afterwards with any other metal without injury to the temper of the article coated. Zi-Led can also be plated or enameled, it is said, better than any other metal. In addition to the Zi-Led process the Ele Kem Company are putting out the following line of specialties under the Ele Kem trade mark.

Ele Kem Metal Cleaner.—Remove grease or oil from all metals without tarnishing. Can be used with or without electric current. Leaves no sediment, throws off no fumes and will not injure the hands nor stain the metal.

Ele Kem Nickel Strip.—Removes nickel or silver plating, or both in a few minutes without injury to the finished surface of the metal, leaving it ready for immediate replating.

Ele Kem Brass, Copper and Bronze Strip.—Removes brass, copper and bronze plating in a few minutes without injury to the finished surface of the metal, leaving it ready for immediate replating.

Ele Kem Brass, Copper and Bronze Brightener.—Takes the place of ammonia, bi-sulphites, carbonates and arsenic. Can be added to the metals and cyanides, or to any present brass, copper or bronze solution, to produce a bright quick uniform plating.

Ele Kem Nickel Salts.—These are especially prepared high speed nickel salts, said to give results far superior to anything on the market today. Can be used for mechanical plating or open tank work.

Ele Kem Black Nickel Salts.—Especially prepared. Will give a dark black lasting gun metal finish.

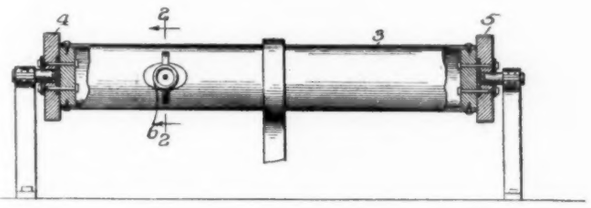
Ele Kem Galvanizing Solution.—A self sustaining solution producing a heavy dense deposit in the shortest time. Can be used in mechanical plating or open tank work.

Ele Kem Soldering Fluids.—High grade soldering fluids, free from acid, for all purposes.

PARSONS' POLISHING PROCESS

A method of polishing articles made from sheet metal that is attracting a great deal of attention at the present time is known as Parsons' polishing process, and the Parsons Manufacturing Company, Chicago, Ill., is now ready to arrange with companies for the shop rights of the process. It is stated by W. R. Parsons, the inventor of the process, that when used in connection with steel balls the very best results are obtained. The essential features of the Parsons process as outlined in patents

Fig 1



TUMBLING BARREL USED IN THE PARSONS PROCESS.

number 957,999, May 17, 1910, and 1,017,268, February 13, 1912, are the employment of small pieces of brass variously shaped, the variety of form depending upon the shape of the articles and parts to be smoothed. In addition to the pieces of brass there is employed 180 emery and neutral oil.

For securing the best possible results in the polishing operation, the tumbling barrel should be filled or substantially filled full with the articles or parts and the pieces of brass for reducing their movement against the barrel and against each other to a degree which will prevent any possibility of their being scratched or indented either by blows against the barrel or from striking against each other, but at the same time the movements of the steel parts and brass pieces should be sufficiently free to reduce a sliding rubbing movement between the articles or parts and the pieces of brass for obtaining a perfect polish without any possibility of any part of their surface being scratched or marred.

The tumbling barrel that may be used for this process can be of any old and well known form. The one shown in the cut has been found by the inventor to produce very good results. Mr. Parsons states in reference to his process, that the length of time to polish a lot of parts depends upon the thickness and temper of the stock used, taking from half a day to three days, but that a large number of parts can be done at one time. He remarks that one large concern, employing about three hundred and fifty polishers and buffers, bought a shop right and have been using it for some time with most satisfactory results, and that they now acknowledge that it has saved them at least $20,000, besides enabling them to turn out a product much superior to anything they had done before.

Further information relating to this process may be obtained by addressing W. R. Parsons, 413 South Clinton street, Chicago, Ill.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.

THE FOUNDRY AND MACHINE EXHIBITION COMPANY

President, F. N. Perkins, Freeport, Ill.; Secretary, C. E. Hoyt; Treasurer, J. S. McCormick, Pittsburgh, Pa. All correspondence should be addressed to the Secretary, C. E. Hoyt, Lewis Institute, Chicago, Ill. The objects of the Association are for the commercial and technical education of iron and metal industries by co-operating with all foundry and manufacturing interests in making an annual exhibit of supplies and equipments in connection with the meeting of the Allied Foundrymen's Associations. The exhibition for 1914 will be held in Chicago, Ill., in September.

Secretary Hoyt announces in reference to the coming exhibition and convention of the Foundrymen's Associations to be held in Chicago, September 7 to 12, 1914, that arrangements have been made for holding all meetings after the first joint meeting at the Saddle and Sirloin Club.

There was considerable complaint last year on the part of some of the exhibitors, and particularly the trade publication people, because of the distance between the exhibition and convention meetings, so the association decided to accept and use the rooms tendered them by the Saddle and Sirloin Club.

The Exhibition Company has offered to co-operate in every way with the associations in order to try to secure good attendance at the meetings. This will be done by means of bulletin boards in the exhibition halls and megaphone announcements that certain papers are about to be read. This would make it possible for anyone who is anxious to hear a certain paper to divide his time between the convention and exhibition.

AMERICAN ELECTRO-PLATERS' SOCIETY

(AN EDUCATIONAL SOCIETY.)

President, Geo. B. Hogaboom, New York; Secretary, F. C. Clement, 462 North 50th St., Philadelphia, Pa. All correspondence should be addressed to the Secretary. The objects of this society are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. The society meets in convention in the spring of each year, subject to the decision of the executive committee. The next convention will be held the first week in June, 1914, at Chicago, Ill. The branch associations hold monthly and semi-monthly meetings in their various cities.

New York Branch held their regular monthly meeting on May 22. The following candidates were elected to active membership: Rocco M. Vinnelo, Ruhlmann Hess, Robert G. Curtis, and Newton R. Dabolt as an associate member. The officers who were elected for the ensuing year are as follows: Thomas B. Haddow, re-elected president; H. E. Bernard, vice-president; Joseph Minges, secretary and treasurer; A. Leimbacher, sergeant at arms; W. R. Shanks, assistant sergeant at arms, William Fischer, librarian, and J. A. Straub, T. P. Davis, J. A. Stremel, C. H. Proctor and William Schneider as board of trustees.

ITEMS OF INTEREST TO THE INDIVIDUAL.

WILLIAM H. HART

President William H. Hart, of the Stanley Works, New Britain, Conn., one of the best known industrial leaders in the country, has rounded out sixty years of active work in the office of the factory where he first started into work when but a mere lad of nineteen years. May 16 marked the passing of the sixth decade since he entered the office and on that occasion the directors of the concern presented him with a handsome silver loving cup, suitably engraved.

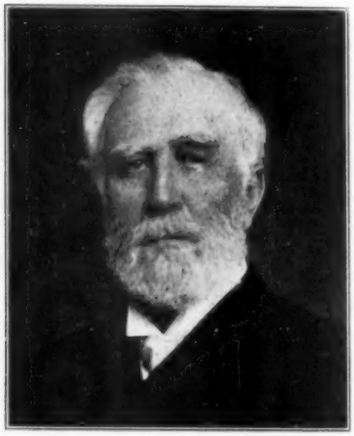


Photo by Murray, New Britain, Conn.
WILLIAM H. HART.

This anniversary was that of the beginning of Mr. Hart's remarkable career, which has been so important in the upbuilding of one of New Britain's largest hardware industries. Sixty years ago Mr. Hart was elected treasurer of the Stanley Works, then a small concern in its infancy. At the same time he also became secretary, all this taking place when he was but nineteen years of age. After holding these offices for eighteen years Mr. Hart resigned as secretary in order that another of his relatives might get the position. However, it was not until fifty years had elapsed that Treasurer Hart laid down the burdens of the treasurership, which have since been held by the Hon. L. L. Hoyt Pease. During these years, nevertheless, Treasurer Hart had been elected to the presidency of the Stanley Works and for two decades he held the two offices. Thirty years ago he was first elected to the head of this $2,500,000 corporation, of which he is still the dominant leader.

When Mr. Hart was elected treasurer in 1854 the Stanley Works had but about twenty employees and the modest capital of $30,000. Since that time the number of employees have been increased one hundred fold, the investment has increased two hundred fold and the production one thousand fold.

Today, at seventy-nine years, President W. H. Hart is hale and hearty and but for defective hearing is as well as he was ten years ago. His spirit is just as young and he takes just as keen an interest in looking after the business of this mammoth concern as he did sixty years ago, when, entering as a young man, it was his sole ambition to "make good." That he succeeded is now shown by the magnitude of the concern, which is proud to have him at the helm.

W. R. Hughes, formerly Cincinnati representative for Frederic B. Stevens, manufacturers of foundry and plating supplies, Detroit, Mich., has become connected as sales manager of the Victor Auto Parts Company, manufacturers of automobile lamps and tools and battery boxes, cincinnati, Ohio.

Lawrence Addicks has resigned as superintendent of the Chrome, N. J., refinery of the U. S. Metals Refining Company, and is now in Douglas, Ariz., in an advisory capacity, to study the possibilities of leaching at the various Phelps Dodge properties and direct the large-scale experiments under way at present at Douglas.

DEATHS

PAUL LOUIS TOUSSAINT HEROULT

Dr. Paul Louis Toussaint Héroult, a pioneer in the electrometallurgy of aluminum and steel, died in France May 9 from an attack of typhoid fever. While he had not enjoyed good health for some time, his death at the age of fifty-one was hardly expected. He was born at Thury-Harcourt on April 10, 1863, and was educated at the Lyceum of Caën, Normandy, and later at St. Barbe, Paris, where he graduated in 1882 to enter Ecole des Mines, Paris. In 1883 he served in the French Army, and then having to conduct his father's tanning business, he never finished his School of Mines studies. He continued his metallurgical researches, however, and in 1886 with a small electric machine developed his alumina reduction process, for which he was granted patents in France, England and the United States. The process for manufacturing aluminum was first put into practical operation July 30, 1888, at the works of the Société Metallurgique Suisse, at Neuhausen, near Schaffhausen.

DR. PAUL L. T. HEROULT.

Dr. Heroult was actively interested in the manufacture of aluminum in the United States. He was the designer and director of the plant now under way at Whitney, North Carolina, and he spent some time at the works giving them his personal supervision. Increasing interests abroad, however, called him back to France, and he severed his connections with the company last fall. Since then he has been occupied with the development of his furnace for melting steel.

His electric aluminum furnace became an instrument for further researches. He made in it the first commercial calcium carbide produced in France, and in undertaking the manufacture in a similar way of artificial corundum, ferrochrome and ferrosilicon, he was led to the investigation of the use of the electric furnace in the iron and steel industry. His successes in this field need no description at this time.

He made a number of extended visits to this country and had a host of friends in the United States. He was naturally the recipient of numerous honors and conspicuous among those early bestowed was the action of the Technische Hochschule of Aachen, Germany, which in 1902, when it opened its new Institute of Metallurgy, gave him the honorary degree of doctor-engineer. The accompanying portrait is shown by courtesy of Metallurgical and Chemical Engineering.

Charles Herman, inventor of the pneumatic jarring molding machine that bears his name, died at his residence in Zelienople, Pa., May 20, aged 70 years. He also developed many other valuable patents known in the hardware and machinery trade. He was vice-president of the Herman Pneumatic Machine Company, Zelienople. He was born in Germany. He leaves a widow and one son.

Trade News

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

JUNE 1, 1914.

There has been great interest here during the past month in the news that a Waterbury company, which had bid for contracts for the manufacture of buttons and metal decorations and insignia for army uniforms, had been beaten out by a large English concern, J. Gaunt & Sons. Out of a $60,000 order the Waterbury bidder received only between $1,500 to $2,000 from the United States government, most of the rest of the order going to the English concern. One of the local papers printed the story and it created a great stir. Congressman William Kennedy (Democrat) of the Fifth Connecticut district came home a few days later and had a talk with Mr. J. Richard Smith, principal factor of the Waterbury Button Company, which had lost in the bidding. Senator George P. McLean, of this State, had referred to the matter in his speech in the senate on the Panama tolls question.

Congressman Kennedy collected what information he could in Washington and it was to compare notes that he sought an interview with Mr. Smith. Mr. Kennedy asked Mr. Smith if he had not had the same experience previously, under Republican administrations. He admitted that he had, but added that he had always protested, on the ground that the British government would not give contracts for army goods to American manufacturers and this country should give home industries the same treatment. Mr. Smith offered to furnish affidavits to prove this. He explained the details of his bids to Mr. Kennedy, showing how some of them were four times as large as the English prices, and others about the same. The only explanation that the difference in bids suggested was that the difference in the cost of labor made it possible for the British concern to underbid all competitors.

Congressman Kennedy suggested that it might be better for the Naugatuck valley concerns to bid in their own names instead of through agents, as many companies do. He claimed that the British embassy had doubted his information to the effect that the English government refused to accept bids from foreign nations for army goods that could be made in England, but promised to give him an official statement if he wanted to take the matter up through the state department of the American government. The outcome has not yet been made public.

Aside from this flurry there has been nothing exciting hereabouts during the past month, not even a large-sized order for goods. The plants of this section are operating on short time, five days ruling in most of them and with from fifty to seventy-five per cent. of their normal number of hands. Now and then a small rush order makes it necessary to put on a few men for nights for a brief period, but on the whole there is no more cheerful news than that things are moving, though not very rapidly. Readjustment is in progress, and as one manufacturer put it when asked how business was: "We have been so busy trying to figure out how it is going to be that we haven't had time to get a good idea of how it is." Common labor is hardest hit by the conditions, and there is evidence of a general "weeding out," although the manufacturers hereabouts have been doing their best to keep men with families or dependents at work.

One of the benefits of keeping up the times is apparent now in the amount of business done hereabouts for automobile manufacturers. Metal materials for use in the construction of all parts of automobiles are produced here in large quantities and hundreds of men are kept at work in departments of local factories where these goods are produced. Similar instances of the forehandedness of the Yankee manufacturer hereabouts may be cited, but his ambition to keep the industries of the country afloat in all kinds of trade weather gets a chilling frost when he sees or hears of government contracts and good American money going abroad for no other reason that that foreign labor is cheaper than American labor, or Americanized foreign labor. Besides the Waterbury Button Company incident there are rumors of awards of contracts to foreign companies for tubing, etc., required in vessels built for the United States navy, although bids presented by Naugatuck valley manufacturers were as low as the most efficient management and the keenest desire to get business without loss could make them.

On the whole the past five months' business has been most exacting of the manufacturers, but has been better than some of the pessimists expected. The outlook is dubious, but not such as to warrant "calamity howling." The summer promises no brisk revival, or even spasmodic rallying, but as it is known that retailers' and jobbers' stock rooms are not overcrowded, it seems likely that the fall will see at least moderate improvement. Everyone is busy looking for contracts and competition is keen—as keen among the employers as it is among the laborers, who are striving to keep off the pauper lists. Bad accounts are being looked after carefully and all accounts are kept moving. Worse conditions will not find the Naugatuck valley manufacturer unprepared, but neither will better conditions find a cold welcome.—F. B. F.

BRIDGEPORT, CONN.

JUNE 1, 1914.

Business in Bridgeport is still rather quiet in most of the metal lines, although there are a few bright spots, as reported by the various concerns when interviewed. The salesmen are considered very good barometers of trade, and the majority of them tell of the slackness of things throughout this region. The foundry supply salesmen in particular state that business is not what it ought to be. It does not seem as though this condition could last long, as all the stocks of the large manufacturers are very much depleted, owing to the purchasing of supplies having been kept down to a minimum. At the start of the depression the buying had been curtailed as far as possible, and this has continued for a long period. Seasonable weather has tended to liven certain industries and the retail trade.

Interest in the legislation at Washington is very keen, owing to the anti-trust bill now before Congress, which contains a measure in regard to labor unions, and which is considered very radical by the manufacturers here. At this writing, it is expected that the House will pass the bill and it is then hoped that Congress will adjourn, as it is felt by many that a period of rest from further legislation would help business a great deal.

Business at the local factories for manufacturing cartridges, guns, etc., is very good, as it has been for the past half year. The electrical goods factories are still experiencing quiet times and see no immediate chances of better business. The graphaphone concerns are even more slack and have laid off a good many men. Automobile manufacturers are doing a good business and keeping the local aluminum and brass foundries fairly busy, as well as the body shops. Motorcycle and bicycle supply people are also doing a very nice business, particularly in headlights, tail lights, etc. The cycle car trade is reported as being excellent.

The brass foundries appear to be doing only a fair business, and the same may be said of the aluminum trade. In discussing conditions with one foundryman it was pointed out that in order to get orders at all, it was necessary to bid very low, just to keep the plants running, and profit is very small. The iron foundries are also not rushed.—F. H. C.

NEW BRITAIN, CONN.

JUNE 1, 1914.

From advices given to THE METAL INDUSTRY correspondent it appears, at the time of this writing, that business is somewhat slow in the factories. While little or no murmur has been heard from the calamity howlers for some time past, conditions in some of the local factories would warrant the setting up of a cry against the present national administration. But a short time ago ten men were laid off at the Stanley Works and all were from the same department. Other concerns are cutting down a little also, but no general lack of employment for skilled men is to be encountered, however. In most of the factories the work is busy in some departments and slow in others, but the work for the most part is being put up for stock orders, there being but little shipping and few orders coming in, it is said. Nevertheless, the salesmen are hoping that the semi-annual inventory in the hardware stores will result in more factory orders, and subsequently more work for the help. At the freight depot it is said that the hardware shipments are light compared with what they were two years ago. The incoming freight, however, is said to be up to the usual standard. The number of the unemployed seems to be rather increasing since the advent of the pleasant weather, but there is no indication of any alarming conditions existing.

The stockholders of the Skinner Chuck Company have authorized the directors to call in $25,000 worth of unissued stock, increasing the capital from $175,000 to $200,000. This new stock is to be issued at par to the stockholders of record on April 27 last and is to be paid by July 1. All the stockholders have signified that they will take up their stock. This concern is one of the most rapidly growing factories in the city and the stock is all held closely. The foundations are being laid at the present time for the erection of a new factory building that will about double the size of the present building.

Within the next few months the large number of factory buildings located in New Britain will be augmented by one more, an eight-story, 65 x 125 foot structure, which is to be erected by the Landers, Frary & Clark Company on a site between its foundry and bread-mixer building. It is expected that this building will be ready for occupancy early in August. The erection of this building will introduce into New Britain a higher factory structure than has ever before been built here, going one better than the American Hardware Corporation, which adopted a policy of putting up seven-story buildings about a year ago. President Charles F. Smith, of Landers, Frary & Clark, is not ready, as yet, to state just what line of goods will be manufactured in this new edifice. This concern is developing very rapidly and now its buildings occupy an entire city block.—H. R. J.

BOSTON, MASS.

JUNE 1, 1914.

Reports from various concerns in the metal industry in Boston and vicinity agree in the statement that business is but moderately active, and none of the manufacturers in silver, brass or copper lines is at all rushed with orders.

Platers are doing a moderate business, and chandelier workers likewise find trade moderate. A manufacturer in the latter branch of industry says that a shrinkage of about 10 per cent. compared with normal business at this season is a fair estimate of the extent of the slowdown for the past three months on an average.

Jewelers are all admittedly doing less than usual, and find orders diminishing in number and volume in many quarters, jobbers reporting the retail trade as measurably curtailed, causing their customers to act hesitatingly in the matter of replenishing stocks.

two years preceding at the corresponding dates.

Manufacturers and wholesalers are agreed upon the fact that the trade as a whole has caught up with orders very closely. In no department, from raw material or supplies to the ultimate consumer, is there the annoying delay in shipping whatever is ordered that was a feature of business generally a year or two ago.

Braman, Dow and Company, who occupied temporary quarters after they were burned out, are again located at 239-245 Causeway street, in their reconstructed building, which is more convenient and better adapted to their use than it was before the fire.

The chief feature under consideration by employers and employed is the labor element and its bearing upon the outlook. Electrical Fixture Fitters', Chandelier Makers' and Electrical Workers' unions are co-operating in an effort to unionize all shops in their lines of work in this vicinity and have appointed a representative to confer with the employers on this subject.

How far they will succeed is problematical. There are a number of Boston manufacturers who have been standing pat for the open shop, while at the same time paying the "going wages." Many of them are opposed to surrendering the right to hire according to their own choice, but may be obliged to yield in order to secure harmony.

The labor issues that have confronted the employers from time to time in the past two years have been settled, as a rule, in favor of the workmen, chiefly because business was sufficiently active to warrant this course. Recent slackness, however, makes the employers less anxious to keep a full crew on the payroll in some of the shops, and the situation is rather more favorable to their contention that shorter hours and higher pay cannot be carried much further.

The Woodman-Cook Company, silversmiths, of Portland, Me., who formerly had an office in this city, are closing out the business, which has been carried on since the retirement of Edward B. Cook by his brother, J. O. Cook, who came to Portland from Chicago in 1912.

The Towle Manufacturing Company, silverware manufacturers, of Newburyport, Mass., has increased its capital to $746,000 by an issue of 2,500 shares of 7 per cent. preferred stock.—J. S. B.

ROCHESTER, N. Y.

JUNE 1, 1914.

The manufacturers met at the Chamber of Commerce and put forth some plans for the education and employment of boys. The shop school will give boys a two years' course in shop practice and in the study of shop mathematics, mechanical drawing, applied science, industrial history, civics and English. On completing the course they will be employed in such numbers as trade conditions warrant. Twenty-seven members of the metal trades endorsed the idea.

The Wilmot-Castle Company, of 800 St. Paul street, manufacture bacteriological apparatus and milk and other sterilizers for hospitals, physicians, laboratories, etc. This concern have their own printing plant, machine shop, plating plant, gas producer engine, light and power plant and a large factory building. They have added a department for the manufacture of pressure sterilizers for large hospitals. Orders are heavy for this country and Canada and considerable demand in Hawaii, the Philippines and other places. This business was established 31 years ago to make steam cookers, afterwards adding many household articles, and since 1892, when sterilization was first introduced in this country, most of their time has been devoted to this line.

E. S. Marsh, who was with the Sunderlin Company, started in business at 62 State street and has put up a small but up-to-date plant for repairing and manufacturing gold, silver or metal parts to watches, clocks and other lines. He will equip the plant with electric power and also do plating. Individual motors will be used for each lathe.

T. Swift and Son, of 72 Spring street, refiners of metals, are enlarging their plant by an addition and will take up some new lines.

The Rochester Spectacle Company have moved from 23 South Water street to 230 Andrews street, where they have three times the former floor space. The factory is very light, clean, sanitary and is rated high for efficiency and safety. New and automatic machinery with safety devices have been installed to make only high grade goods. They make mountings and frames of gold and gold filled. They also have installed a plating department in a fireproof room, a good machine shop, and they have a special process for hardening the gold and gold filled straps on the mounting. Frank

Startz is the superintendent, George Benedict is secretary and salesman. This concern has opened in London, England, at 43 Grays Inn Road, in charge of Max Weissman.

Bausch and Lamb Optical Company have adopted a health efficiency plant which will no doubt be copied by various large plants throughout the country. It is to determine by physical examination the work best fitted to each employee and is the outcome of some years of study by Dr. Harold H. Baker, of 318 Lake avenue. Suppose several men are at work at a bench, one is strong and one is not so strong, or may have heart trouble. The latter has to toil twelve hours to make as much as the stronger man in eight hours. The weaker man is placed at less dangerous and easier work and the stronger man at the position which requires strength or where he is best fitted. If they want more metal workers, assemblers, carpenters, jewelers or lense grinders, they are examined and put where he or she saves strength and accomplishes more. If one has weak eyes he is put at work where his eyes are under no strain and if he has good eyes is put at the finer work. The wages of employees are not affected and the firm pays the expense of examination. A hospital service has been established and it is being enlarged. —H. S.

BUFFALO, N. Y.

JUNE 1, 1914.

The past month has been quiet with most metal concerns in this locality, as there has been a slight falling off of business. This is not only true of the foundries, but also the electroplaters. In fact, the electroplaters expect business to continue to drop in their line all through the summer. Local finished metal product manufacturers, however, had a good month, working their operations full capacity.

Buffalo is a pioneer in the safety first crusade, as far as the breadth of the scope of the propaganda is concerned. It was declared by Dr. William H. Tolman, director of the American Museum of Safety of New York, in a recent address made in Buffalo, that with proper safety devices and an energetic educational campaign Buffalo could reduce 50 per cent. of its accidents. And since Dr. Tolman's visit to this city, everybody seems to have taken hold of this safety first crusade with enthusiasm. All the metal plants are working safety first for all it is worth. The Aluminum Casting Co., for instance, sells "slip on shoes" to all their foundry workers at cost price, so as to discourage the men from wearing a laced shoe. On May 14-15 the New York State Industrial Board met in Buffalo upon the invitation of the recently organized Associated Industries. The board came to hear the manufacturers and others relative to the sanitary conveniences and regulations which are to be established for the industrial plants under the recently enacted factory law.

The National Bronze Foundry Company will move some time in June from their present quarters on Illinois street into the old American Bronze Company's plant, located at 1413 Niagara street, which is much larger and better equipped than their present plant.

At a recent meeting of the directors and stockholders of the Buffalo Copper and Brass Rolling Mill, the capital stock of the company was raised from $500,000 to $1,000,000.

The following filed certificates of incorporation in the Erie county clerk's office during the past month: Buffalo Brass Foundry Company, capitalized at $5,000, who will manufacture, sell and deal in brass, copper, aluminum and all other metals and metallic compounds; also the Cataract Brass Stamping Corporation, capitalized at $50,000, who will do stamping, manufacture and sell all kinds of metals.

The Titan Copper Products Company, Inc., which was shut down for some weeks, has resumed operations.

The Trenton Brass and Machine Company, of Trenton, N. J., manufacturers of the Fletcher Carburetor, which is manufactured under the Anderson patent No. 1,041,708, granted October 15, 1912, have filed a suit in the United States court at Buffalo, N. Y., against James G. Barclay, Inc., Buffalo distributors for the Stromberg Carburetors. An answer has been filed by the defendant and a stipulation has also been filed making the Stromberg Motor Devices Company a party defendant. The case comes up for trial at Rochester, N. Y., on June 15.—G. W. G.

TORONTO, ONTARIO, CANADA

JUNE 1, 1914.

J. E. Fennell, of 561 King street west, is the agent for the Davies-Bournonville Company for their oxy-acetylene apparatus.

The Canadian Seamless Wire Company at 88 Terauley street plan to put in a new line of parts for making bracelets, using gold and gold filled tubing. Gold filled and rolled gold plate are in the best demand among the trade they sell to. The refining of gold and platinum has increased considerably with them and they are planning to make extensions to take care of that particular trade.

George A. Marshall opened an office at 70 Lombard street and is representing George Butler and Company, of Sheffield, England, in cutlery, plate and razors; William Atkins and Company, Sheffield, England, tools and files; Thomas Smart and Sons, Dudley, England, brass founders and art metal work.

Keiths, 109 King street west, have gone out of the business of making brass and metal goods and have gone into the contracting line.

The McClary Manufacturing Company, of 179 West King street, have a large stove and range plant at London, Ont., and use a large amount of nickel plated parts. A branch is being opened in Edmonton, Alberta, in charge of D. G. Clark.

The Fletcher Manufacturing Company, of 35 Hayter street, manufacturers of soda water fountain supplies, operates a plating plant and work in brass, galvanized iron, copper and German silver.

Duggan and Levy, of 166 King street west, have taken the Kronheimer and Oldenburch Company agency of Brooklyn for brass mounted photo frames and souvenir goods, as well as art brass, silver plated ware and electric portable table lamps.

H. Von Nierhoff, of 128 King street west, is handling a line of Dutch brass fancy goods of all kinds and act as importers and agents. He reports that the brush brass antique finish is the main style in demand for brass goods.

Sturgess and Company have succeeded Edward Fisher, at 75 Peter street, making dies, tools and special machinery for the metal working trades. Mr. Fisher is now with the Pedlar Company, sheet metal workers, of Oshawa, Ont.—H. S.

NEWARK, N. J.

MAY 4, 1914.

The Robert E. Lee Company, platers and gilders, are doing considerable business in the new lines of polishing and lapping.

The Wright Manufacturing Company have made improvements to their metal novelty plant, at 70 Morris avenue.

B. Conlon & Co. built a large addition to their plant some time ago, working largely in brass and steel.

The Hanson & Van Winkle Company have had a big demand for their new lacquers, gold dyes, etc., and the buffs, steel and brass wire and bristle brushes have had a fair sale.

The Morris China Company, of Trenton, have been of late doing considerable fine work in silver deposit on china and are making clock cases and novelties.

The Art Metal Works have made many improvements and increased the output.

The New Jersey Aluminum Company made several improvements to their plant at Irvington and have taken up some new lines.

The city of Corning, N. Y., is after the plant of the National Aluminum Company, which burned down at Wellesville, N. Y. This firm employed 100 hands. It has not been decided where to rebuild.

Louis E. Frenot has discontinued the gold, silver and bronze casting business.

Joseph F. Curry also retired from the plating business and manufacturing brass goods.

The Second Hand Machinery Company erected a fine building for their use at 105 Chestnut street.

The W. Green Electric Company, of 81 Nassau street, New York City, are pushing the sale of their electric polishing and buffing motors and have loaned the same to the government at

different times for the purpose of polishing coin made at the various exhibitions.

The American Oil and Supply Company, 46 Green street, have started in making felt wheels for buffing purposes.

Eckelhofer Brothers, of Irvington, are making lines of cast metal goods and novelties, also aluminum tops, and have an up-to-date brass, gold, silver and nickel plating plant.—H. S.

PHILADELPHIA, PA.

JUNE 1, 1914.

The metal trades have been in fairly good condition, but business has not been real strong. Collections are a little slow and there has been a slowness to buy on the part of the manufacturer, jobber, retailer and the general public. Some lines have been stronger than others.

John N. Carter, of 138 East New street, Lancaster, Pa., reports that the Safety Manufacturing Company, of that city, which took over the Independent Foundry Company, have been in the hands of the receiver and Mr. Carter has charge of the affairs.

The Aluminum Company of America, of Pittsburgh, Pa., have built a small plant at Arnold, Pa., to manufacture aluminum foil for such purposes as tin foil, for electric apparatus and photo work.

The Union Manufacturing Company, of Boyertown, Pa., are contemplating putting in cupola, molding machinery, sand blast and tumbling barrels.

J. P. Koehler Company, of Pittsburgh, smelters and refiners of metal, have erected a new smelting plant, 72 x 100 feet, and of fireproof material.

The Reading (Pa.) Casting Company took over the Gray Iron Foundry Company, of that city, and are making hardware castings. They have also installed sand blast equipment and machinery for hot galvanizing and nickel plating.—H. S.

DETROIT, MICH.

JUNE 1, 1914.

No material change has taken place in the brass and aluminum industry here during the last month or so. Every factory in the city seems to be operating in a moderate way and but little new work is in sight. Trade conditions are light and manufacturers in this line do not hesitate to express their belief that a light period of business will be experienced during the next month or so. They do not expect, however, the quiet period to continue for any length of time and the majority are optimistic in their forecast of the future.

No new buildings are being erected by any of the brass or aluminum manufacturing concerns in the city at this time, with the exception of the $1,000,000 addition to the Ford Motor plant in Highland Park, where that company has well under way a great addition that will materially increase its facilities for production during next winter. This addition will, it is stated, include a great brass and aluminum foundry that will be more complete than any other foundry of the kind in the city.

The report that was sent through the country that the Ford company was planning to materially decrease its number of employees seems to be somewhat exaggerated. The company is laying off a few hundred men in relays each month, the period of idleness not extending more than thirty days, and at the present time no more men have been laid off than one year ago at the same time. So far as can be learned there will be no radical methods employed in laying off the men during the present summer.—F. J. H.

COLUMBUS, OHIO

JUNE 1, 1914.

The metal markets in Columbus and central Ohio have ruled quiet during the past month. Prices are still weak and are inclined to weaken in the face of poor buying. Concerns which are using metals are loath to increase their supplies and are following the policy of buying only what they absolutely need. They do not want to take chances on a declining market.

One of the features is the small number of new concerns which are being organized to use metals. This accounts for the small buying to a certain extent, although the oldest established concerns are not buying much at all. The prospects for the future do not appear bright, according to those in a position to say. Both the state and national administrations are unfavorable to development in manufacturing lines.

Brass is still quiet all along the line. Red brass scarps are sold at $12.50 to the trade, while yellow scraps are quoted at $8.50 to $8.75. Copper is also quiet and crucible shapes are quoted at $14.25 to the trade. Aluminum is not strong in any locality. New clippings are quoted at 16 cents and bar aluminum at 18 cents. Babbitt metal is quiet and the prices are unchanged from the previous month.—J. W. L.

CINCINNATI, OHIO

JUNE 1, 1914.

Business has continued slow with practically all branches of the metal industry in and around Cincinnati, with no perceptible signs of improvement. The failure of the various machinery lines to pick up to any extent is responsible for very slack business among the various metal concerns, and with the normally dull season of the summer immediately ahead, prospects are not bright for an immediate betterment of these conditions. The strike of the carpenters, which has been in progress for more than a month, with no indications of an early settlement of the difficulty, has had the immediate effect of throwing out of work several thousand men in other lines, whose work necessarily depends on that of the carpenters, and the metal trades have been to some extent affected by this. The coppersmiths supplying equipment to the brewers and distillers are working only part of the time, for the most part, the brewers giving them more to do just now than the distillers. The latter are preparing to close down, in many cases, but such repairs as are needed will hardly be made until later in the season.

The Eagle Manufacturing Company, of Cumminsville, a suburb of Cincinnati, Ohio, recently increased its capital stock from $50,000 to $100,000, for the purpose of securing additional capital to provide for taking care of increased business. A brass foundry will be added to the plant, to be equipped by Cincinnati concerns, at a cost of about $15,000, and will also put in a large addition to its plating plant, at a cost of about $6,000.—K. C. C.

LOUISVILLE, KY.

JUNE 1, 1914.

Coppersmiths in this territory have complained considerably of late of the scarcity of skilled labor. It is true that during the past few seasons the amount of work has hardly been up to the average, so that the pressure has not been as great as usual, but when business is brisk and the manufacturers are rushed, the fact that the labor supply is extremely limited is pressed home. The work calls for long experience, and it is said that the journeymen, preferring to keep the market limited, do not encourage apprentices to learn the business. The result is that the employers have little opportunity to increase the working force, and the supply remains decidedly limited at all times.

Building operations in this territory are opening up much better than last year and manufacturers of bath tubs, plumbing supplies and other workers in brass and lead are much pleased with the situation. They report that they have been busier during the past month than at any other time during the current season. Good crops are in prospect, and this also is expected to stimulate building operations, as it will tend to make everybody in the farming communities prosperous. Another opening for the plumbing supply people is found in the number of waterworks systems that have been put into numerous small communities throughout Kentucky and the Central South. Wherever waterworks appear, bath tubs follow, and the plumbers and the supply houses are consequently given an opportunity which they seldom fail to take advantage of.

The brewers, like their friends the distillers, are rather perturbed over the prohibition situation, and are not inclined to spend large amounts in work on their plants. Repair work, rather than new installations, is the order of the day. This

being the active season for the breweries, however, only ordinary maintenance work is expected at this season.

Brass-working concerns report a good call for fittings for elevators, the amount of new building going on having introduced a strong demand for wheels and other brass goods used on elevators. Hines & Ritchey, local coppersmiths, have been doing a lot of pattern making for B. F. Avery & Sons, Louisville plow manufacturers. This concern has recently built for its own use a new model of copper pipe coiling machine, which is featured by the fact that it does not cause the pipe to pucker or lose diameter in coiling, as often happens otherwise.—G. D. C., Jr.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Chalmers Motor Car Company, Detroit, Mich., have awarded a contract for the erection of a one-story brick addition, 87 x 120 feet, to its foundry.

The Pneumatic Scale Company, Ltd., Boston, Mass., have purchased the Nyham Brass Foundry, New Port avenue, Norfolk Downs, Mass., which will not continue to be used as a metal foundry.

The Ansonia Brass & Copper Company, Ansonia, Conn., will erect a two-story building 60 by 440 feet, which will be of brick, steel and wood which they will use for shipping and storage purposes.

A petition has been filed against the Backus and Leeser Company, dealers in polishing and platers' supplies, at 410 West Thirteenth street, New York, by these creditors: S. Wilson, $800; Philip J. Onkey, $70, and A. Cummins, $100.

The Sterling Brass Company, 1366 East 47th street, Cleveland, Ohio, whose foundry was damaged by fire on March 13 to the extent of $10,000, will rebuild. Besides a brass machine shop this company operates a plating and polishing department.

The twelfth annual report of the International Nickel Company issued for the fiscal year ending March 31, 1914, shows a total business of $6,566,786.56, and a total business expense of $1,336,309.83, giving a profit for the year of $4,792,664.75, out of which were paid the dividends on the stock., 6 per cent. on the preferred and 10 per cent. on the common.

The Crown Rheostat & Supply Company, Chicago, Ill., exhibited their rheostat and panel board, described in the "Equipment" section of this issue of THE METAL INDUSTRY, in Parlor B, at the Fort Dearborn Hotel, at the second annual convention of the American Electro-Platers' Society, which attracted considerable attention and a great many favorable comments.

The Celluloid Zapon Company, New York, manufacturers of lacquer, have bought a plot of ground containing 40,000 square feet at 45th and La Salle streets and the Lake Shore R. R. at Chicago, Ill. The property will be used for a store and warehouse to take care of western trade. Nothing in the way of development is expected to be done before fall.

The Coleman Foundry Equipment Company, Cleveland, Ohio, has been organized for the purpose of manufacturing the same line of foundry equipment formerly placed on the market by the J. D. Smith Foundry Supply Company. The incorporators are F. A. Coleman, president; formerly president of the J. D. Smith Foundry Supply Company, and C. H. Frank, secretary and treasurer.

A. Held, proprietor of the Guarantee Bed Spring Company, Schenectady, N. Y., who for several years has carried on a successful business at 359 Veeder avenue, has recently added a new branch to his factory, known as the Guarantee Polishing and Plating Company. A complete plant of the most up-to-date machinery has been installed and every process of silver, nickel, brass and copper plating will be done.

The Columbia University, of New York City, have announced that the summer session will take place from July 6 to August 14, at which a course is offered to jewelers and others in gems and gem minerals assaying. No entry examination is required for any of these courses, but some knowledge of chemistry is desirable. For information address the Secretary, Columbia University, New York.

The Wilcor Manufacturing Company, manufacturers of Schulz metal spinning lathes, Chicago, Ill., announce that after a trial of their machine they have secured the order of the Massillon Aluminum Company, Massillon, Ohio, for ten 24-inch swing lathes for June delivery. They are of the double ball bearing variety designed and placed on the market by the Wilcor Manufacturing Company during the present year.

The S. C. Carpenter Drafting and Engineering Company, machine and tool designers, Hartford, Conn., announce that they now have ready for delivery 9 charts for converting from foreign to United States money of 25 countries. This company also have charts for wire gauges, drill and machine screws and say that they make special charts for engineering and mechanical calculations. They will be pleased to receive inquiries relating to these lines of charts.

The Rome Manufacturing Company, Rome, N. Y., have issued the following notice:

"Our factories will be closed for repairs, changes, etc., from Saturday noon, June 27, to Monday morning, July 13. During this time our employees, both office and factory, will be on their vacations, so that only emergency orders for stock products can be handled. We would suggest that specifications for bedstead trimmings, tubing, copper flue ferrules and all special products required over period of shutdown be placed prior to June 15."

The Watson-Stillman Company, of Aldene, N. J., and New York City, has recognized the fifty years of service in its employ of Richard Ward Baker by presenting to him a substantial check and extending to him a month's vacation. Mr. Baker began his apprenticeship in a small factory in Grand street on the 2nd day of June, 1864, and has been continuously identified with The Watson-Stillman Company and its predecessor ever since. A special resolution was passed by the Board of Directors of The Watson-Stillman Company expressing its high esteem of Mr. Baker's long and loyal service, and the resolution was presented to Mr. Baker in the presence of the employees, officers and directors of the company at its Aldene plant.

The increased demand for "Mount Gilead" hydraulic valves and fittings has necessitated the enlargement of the brass foundry operated by The Hydraulic Press Manufacturing Company, Mount Gilead, Ohio. This foundry now occupies an entire building which is 90 feet long and 30 feet wide. Three furnaces are continuously operated. This company builds all their own valves and fittings for their extensive line of hydraulic presses and pumps, as well as a great many valves for special purposes. In addition to this considerable contract brass casting work is also taken care of. Recently this company has put in operation a new erecting shop which was built to take care of the increased demand for their heavy hydraulic presses and pumps. This building is 120 feet long, 80 feet wide, with an extreme height of 54 feet. The equipment for this building includes a heavy electric traveling crane for handling heavy castings and for transporting the heavy machined parts for assembling. A switch from the New York Central lines runs through one end of the building. This gives added convenience in handling and loading, as the crane can be operated directly over the car.

ANNOUNCEMENT

Branch offices of the Bureau of Foreign and Domestic Commerce have been opened in New York, Chicago and New Orleans, where the bureau's publications, samples of foreign-made products, plans and specifications of construction work abroad,

lists of foreign dealers in various lines, manuscript consular reports, and similar documents are available to interested individuals and firms. Reserved addresses in connection with "Foreign-trade opportunities," published in the Daily Consular and Trade Reports, may be obtained by application in letter form from these offices. It is suggested that firms in the districts served by these branch offices acquaint themselves with the material available through them, as time may frequently be saved by making application to the branch office instead of to the bureau in Washington. The addresses of the branch offices are as follows:

New York, Room 315, United States Custom House.
Chicago, 629 Federal Building.
New Orleans, Association of Commerce Building.

EMBLEM OF NEW YORK

New York City now has a distinctive emblem, typical of its vast industrial and commercial activities.

The emblem was evolved by The Merchants' Association after a prize competition in which a large number of drawings were submitted.

The emblem was announced at the dinner given by the Members' Council of The Merchants' Association for the sons of members at the Waldorf-Astoria on Tuesday, May 26.

THE NEW EMBLEM OF NEW YORK.

It is the intention of the association that merchants and manufacturers who ship goods from New York to all parts of the country shall attach to each package shipped a reproduction of the design in the form of a paster, stencil, tag, or in any other form that the shipper may prefer. In this manner the immense volume of merchandise which goes out annually from this city will advertise New York's supremacy as a commercial center all over the world.

The design has been copyrighted by The Merchants' Association as a precautionary measure. Permission to use it will gladly be given to merchants, manufacturers and others upon application to the association.

CANADIAN PLATING PLANT

The Canadian Hanson & Van Winkle Company, Toronto, have recently installed a modern electro-plating and experimental plant for the use of their customers in their Toronto works, where will be found in operation all the latest and most up-to-date equipment. This plant is complete in every detail making it possible to give practical demonstrations in all classes of electro-plating, using the most modern methods known today. The plant has been designed and installed by W. R. King, plating expert of the Hanson & Van Winkle Company, of Newark, N. J., and is to be carried on under similar lines as the one operated by that company in Newark. The plant is laid out to give the greatest economical efficiency possible, the electric current being supplied by a Hanson & Van Winkle generator set, the dynamo being directly connected by means of a flexible coupling to a suitable motor, both units mounted on a sub-base. The dynamo itself is of the newest design made by the company.

It might be said that it is of great importance to a plating plant to have in operation a motor generator set instead of having the dynamo belted from the regular shafting carrying other machinery, so that the plant can be run independently. In this plant a separate motor is employed for operating all other equipment, such as mechanical plating apparatus, polishing machinery, brush lathes and air compressors for lacquer outfit.

A special feature is the use of mechanical devices for both polishing and plating, which reduce to a minimum the amount of handling of the work, thus materially reducing the cost of the operation. Mechanical plating has in recent years rapidly come to the front, which with the addition of the burnishing barrel has cut the cost of electro-plating enormously and the special cleaning compounds which have been perfected in recent years which can be used either as electric cleaners or still solutions, such as "kostico," has also helped to reduce the plater's troubles.

ELECTION OF OFFICERS

At the annual meeting of the Chase Metal Works, Waterbury, Conn., the following officers and directors were elected: H. S. Chase, president; F. S. Chase, treasurer, and F. B. Noble, secretary.

CHANGE OF FIRM NAME

The firm name of the Detroit Tube Products Company, manufacturers of water pipes for gas engines, hot water coils, etc., Detroit, Mich., has been changed to the American Tube Products Company. The location of the company's plant has also been changed to Euclid avenue and Grand Trunk Railroad, Detroit, Mich.

REMOVALS

The Stenotype Company have moved their plant from Owensboro, Ky., to Indianapolis, Ind.

The Globe Plating Works, 848 Massachusetts avenue, Indianapolis, Ind., have removed their plant to 1421 South street, La Fayette, Ind.

The Hooper-Falkneau Engineering Company, industrial engineers and architects, have removed their offices to suite 1926, Woolworth Building, New York City.

The National Aluminum Works, manufacturers of aluminum ware, whose factory was destroyed by fire some months ago, have moved their plant from Wellsville, N. Y., to Elmira, N. Y.

The Pittsburgh office of the Brown Instrument Company, manufacturers of recording instruments, Philadelphia, Pa., has changed its address from Room 943 to Room 2138, Oliver building, Pittsburgh, Pa.

The Cleveland Alloys Company, manufacturers of white metal products, Cleveland, Ohio, have moved their offices and works to their new plant at 2000 Elm street, where they have improved and modern equipment and shipping facilities for filling orders.

James Savage & Company, brass founders and manufacturers of castings in aluminum, brass and bronze, formerly located at 233 Java street, Brooklyn, N. Y., have moved their plant to larger quarters at 206-208 Newell street, Brooklyn, N. Y., where they will be able to double the output of their products.

The Colonial Works of the Osborn Manufacturing Company, Milwaukee, announces its removal from Florida street to South Water and Ferry streets. The whole of this four-story building (about 36,000 feet of floor space) is occupied by the Osborn company. Being the largest manufacturers of brushes and brooms in the Northwest, the extra floor space has been much needed, both for manufacturing and storage purposes. The Milwaukee factory makes almost any kind of brush or broom that can be wanted, including a great many special styles and shapes for machine use, manufacturing purposes and various specialized trades.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To manufacture silver and plated ware.—Libby Manufacturing Company, Melrose, Mass. Capital, $50,000. Incorporators: John R. Chick, Madison, N. H.; Edward W. Libby and Annie M. Libby, Melrose.

To manufacture spun aluminum ware.—The Toledo Aluminum Company, Toledo, Ohio. Capital, $5,000. Incorporators: William H. Bell, George E. Bell, Ralph C. Thayer, Herbert Wright and Cornell Schrieber.

To manufacture metal products of all kinds.—The Chisholm-Moore Manufacturing Company, Cleveland, Ohio. Capital, $5,000. Incorporators: J. T. Scott, David Johnson, M. C. Byrnes, M. G. McAleenan and B. E. Robertson.

To manufacture die and special machine work.—The Acme Die and Stamping Company, Urbana, Ohio. Capital, $10,000. Incorporators: C. M. Diver, R. B. Duffrey, Charles Keener, Lincoln Burnham and Ralph C. Burnham. This company is a reorganization of the Urbana Engineering Company which was organized a few months ago. The company has its factory in the Gaumer building in West Court street. It is also reported that considerable new equipment will be installed and the factory's capacity greatly increased.

To manufacture ingot metal, brass and bronze castings, babbitt metal.—Southern Metal and Foundry Corporation, Norfolk and Portsmouth, Va. Capital, $100,000. Incorporators: Fred D. Miller, president; Leigh R. Watts, vice-president; H. C. Macklin, secretary; Charles R. Welton, treasurer, and R. Frank Welton, a director. The company has purchased four buildings at Norfolk which they will remodel and equip with modern machinery for smelting and refining brass foundry residue and the manufacture of journal and engine brasses, babbitt metal and ingot brass.

FOREIGN TRADE OPPORTUNITIES

[In applying for addresses at Bureau of Foreign and Domestic Commerce, Washington, D. C., refer to file number.]

No. 13154. Copper and other metals.—A copper foundry in a European city informs an American consulate that it wishes to be placed in direct communication with American exporters of old copper and other metals.

No. 13,068. Brass, copper and lead.—The leading importers and distributors of heavy hardware in an important center of the Near East are in the market for brass and copper in sheets, and lead ingots. Correspondence should be in French, and prices must be quoted c. i. f. certain city. Terms, cash against documents. Duplicate copies of correspondence should be sent to the American consular officer who forwarded this report.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

PRINTED MATTER

Rip Saw.—A perfected straight edger and rip saw, the principal features of which are covered by applications for patents, is described in a folder just issued by P. Pryibil Machine Company, New York. This machine is known as the "Chicago" No. 121 D.

Brass Foundry Equipment.—The Whiting Foundry Equipment Company, Harvey, Ill., has issued catalog No. 108, superseding No. 91, and which gives complete descriptions of the brass foundry equipment manufactured by this concern. There is also described a series of cast iron tumbling barrels which are designed for use in brass work.

Sand Mixer.—The W. Bilz Sand Mixing & Sifting Machine Company, New York, have issued a small folder giving illustration and description of the Bilz Sand Mixer and Sifter, which is claimed will sift and mix 100 pounds of sand per minute. The manufacturers state that this mixer is now being used by a large number of representative firms with entire satisfaction.

Air Hoists.—The Whiting Foundry Equipment Company, Harvey, Ill., have issued catalog 107 superseding 93 in the interest of their line of air hoists. This catalog, which consists of twenty pages, describes and illustrates the standard types of "A. B. and C." hoists, together with the necessary valves and appliances that are necessary for hoist equipment. Copies will be mailed upon request.

Presses.—The Consolidated Press & Tool Company, Hastings, Mich., have issued a comprehensive catalog No. 10 of 80 pages, giving a complete description of their line of open back inclinable presses. This line of presses include the consolidated inclinable bench, power, horn and foot presses, also special forging and trimming, double crank, arch, horn and apron and the various numbered lines of presses. Copies will be sent on request.

Electric Bronzing.—The Rojas Electro Chemical Company, New York, have issued a very handsome 18 page booklet covering the Electrochromo Process of Metal Coloring by Electro Deposition. The history of this process is given and also full descriptions of the various finishes and color effects which can be obtained by its use. Also no fewer than 24 vital advantages of Electrochromo are cited in the pamphlet, copies of which will be sent upon request.

Brushes.—The Munning-Loeb Company, of Matawan, N. J., have just issued Bulletin 500 on their line of plating and industrial brushes. The book contains information on brush manufacture from the making of the block, selection and origin of stock to the final finish. Operating characteristics of the several brush materials and their adaptability to certain classes of work are briefly discussed. This book will be found a handy guide to the buyer in selecting the best and proper brush. It will be sent by writing to the Munning-Loeb Company.

Alloys.—Lumen Bearing Company, New York, have just issued a new booklet, "Bronze Alloys and Babbitts," which they announce is now ready for distribution. This is a very valuable little booklet and under each alloy the company have given the tensile strength and elongation of a test bar cast in a chill and also of a bar cast in sand. There is also given the Brinell hardness on chilled and sand cast pieces. This is the first time that such information as the above has been published, and makes the booklet unique in this respect.

Furnace Efficiency.—A book of 126 pages has been issued by Joseph W. Hays, combustion engineer, on how to build up furnace efficiency and which is claimed to be a hand book of fuel economy. The work, as Mr. Hays remarks, is made up of five reels and each one of these give specific information regarding the subject treated. The chapters as enumerated are as follows: 1. Why Fuel Is Wasted. 2. How Fuel Is Wasted. 3. How to Determine Fuel Wastes. 4. How to Stop Fuel Wastes. 5. How to Keep the Fuel Wastes Stopped. This work is sure to prove very valuable to users of fuel of any kind and may be obtained from Joseph W. Hays, Rogers Park, Chicago, Ill., for $1.

Platers' and Polishers' Supplies.—Walter C. Gold, 235 Race street, Philadelphia, has issued a new catalog which contains 175 pages, including index, and measures 6⅛ x 9 inches. It is built up in nine sections and is arranged as nearly as possible so that it covers the complete line of grinding and continuing through to the finest buffs and rouges for coloring. The catalog is well printed upon a good quality of glazed paper and is profusely illustrated. It is filled with details and information of interest to the grinder, polisher and plater. In the back of the work there is contained a Supplement* written by Charles H. Proctor, which is reprinted through the courtesy of this journal. The catalog is indexed by what is termed the "Cross Index" system, thereby facilitating the matter of ascertaining the location of a desired article.

*Chemical, commercial and common names of platers' chemicals. THE METAL INDUSTRY, December, 1911.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL MARKET REVIEW

NEW YORK, June 8, 1914.

COPPER.

The copper market has been very dull during the month of May. There was a little buying up to about the fifteenth, both by domestic consumers and the foreign buyers, but since then the business has been of the smallest. According to some reports in the trade actual business conditions are not as bright as they might be and consumption of copper is still considerably below normal and there does not appear any signs of any kind of an improvement. Matters do not seem very much better abroad, our exports are very heavy, and when all reports are in will be over 32,000 tons for the month, but the stocks abroad are beginning to show an increase in the monthly statistics and this may mean that Europe will not be such an eager buyer.

Prices are lower and the producers today are taking what little business there is at 14¼ cents against 14⅜ a month ago. Dealers and second-hand lots are selling at from 10 to 15 points below producers' prices, but there is very little business and very little copper offering.

TIN.

The London prices show a further heavy decline for the month. Spot tin is quoted in London today at about £143 against £217 a year ago.

Spot tin in New York is around 31½ cents against 34 cents a month ago when tin was supposed to look cheap.

The statistics for month are not very favorable, showing considerable increase in the visible supply and this may have a further depressing influence on prices.

LEAD.

The trust price for lead has been held steady at 3.90 New York during the month. Business has been very dull, sellers do not care to offer lead for sale beyond July and consumers do not care specially to buy.

Market today is 3.90 New York for carload lots and 3.82½ in East St. Louis.

SPELTER.

Market has been very dull and prices are about the same as a month ago. Carload lots New York 5.15 to 5.20 and in East St. Louis about 4.95.

ALUMINUM.

Hardly any change in aluminum and prices are about ⅛ cent per pound lower. Market is very dull. Ingots in ton lots 98-99 per cent. at 17¾ to 18 cents per pound.

ANTIMONY.

Prices are unchanged from last month. Cookson's is quotable at 7¼ cents, Halletts at 6⅞ with Hungarian grade at around 5¾ cents.

SILVER.

Prices for silver are easier again. New York is quoted at around 57 cents and London at 26⅛d.

PLATINUM.

Market very dull, hardly any demand except from the electrical companies. Ordinary refined at $43 to $44. 10 per cent. hard at $46 to $47.50, 20 per cent. hard at $49 to $51.50.

QUICKSILVER.

The wholesale price of quicksilver is $37.50 with jobbing lots at from $38 to $39 per flask.

SHEET METALS.

Sheet copper has been reduced ½ cent per pound to 19¼ cent base; copper wire is quotable at 15¾ cents with high sheet brass at 14¼ cents.

OLD METALS.

The old metal market is very dull and prices are inclined to be lower. Some little export business doing, but prices are very low.—J. J. A.

MAY MOVEMENTS IN METALS

COPPER.	Highest.	Lowest.	Average.
Lake	14.75	14.25	14.75
Electrolytic	14.25	14.00	14.15
Casting	14.15	14.00	14.00
TIN	34.50	31.50	33.30
LEAD	3.90	3.90	3.90
SPELTER	5.25	4.95	5.20
ANTIMONY (Hallett's)	7.00	6.80	6.90
SILVER	59⅛	56½	58.15

WATERBURY AVERAGE

The average price of Lake Copper per pound as determined monthly at Waterbury, Conn.

1912—Average for year, 16.70. 1913—Average for year, 15.83. 1914—January, 14.75; February, 15.125; March, 15.00; April, 14.85; May, 14.75.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

June 8, 1914.

		Pounds.
Stocks of marketable copper of all kinds on hand at all points in the United States, May 1, 1914		70,337,001
Production of marketable copper in the United States from all domestic and foreign sources, during May, 1914		142,308,287
		212,645,288
Deliveries:		
For domestic consumption	55,592,170	
For export	72,710,477	
		128,302,647
Stocks of marketable copper of all kinds on hand at all points in the United States June 1, 1914		84,342,641
Stocks increased during the month of May		14,005,640

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

Metal Prices, June 8, 1914

METAL PRICES.

	Price per lb. Cents.
COPPER—PIG AND INGOT AND OLD COPPER. Duty Free. Manufactured 5 per centum.	
Lake, carload lots, nominal	14.50
Electrolytic, carload lots	14.25
Castings, carload lots	14.00
TIN—Duty Free.	
Straits of Malacca, carload lots	31.00
LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	3.90
SPELTER—Duty 15%. Sheets, 15%.	
Western, carload lots	5.10
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	23.00
100 lb. lots, f. o. b. factory	21.00
Ton lots, f. o. b. factory	18.00
ANTIMONY—Duty free.	
Cookson's cask lots, nominal	7.25
Hallett's cask lots	6.85
Hungarian grade	5.75
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad. valorem.	
Shot, Plaquettes, Ingots. Blocks according to quantity	.38 to .43
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL—Duty 10%	.75
MAGNESIUM METAL.—Duty 25% ad valorem (100 lb. lots)	1.50
BISMUTH—Duty free	2.00
CADMIUM—Duty free	.95
CHROMIUM METAL—Duty free	.98
QUICKSILVER—Duty 10%	.53
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	43.50
SILVER—Government assay bars—Duty free	.56½

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10%.....according to quantity	26 to 29
Silicon Copper, 20%..... " "	28 to 32
Silicon Copper, 30% guaranteed " "	30 to 34
Phosphor Copper, guaranteed 15% "	25 to 29
Phosphor Copper, guaranteed 10% "	23 to 28
Manganese Copper, 25%..... " "	25 to 29
Phosphor Tin, guaranteed 5%. " "	57 to 60
Phosphor Tin, no guarantee.. " "	38 to 40
Brass Ingot, Yellow..... " "	10 to 10½
Brass Ingot, Red..... " "	12 to 13½
Bronze Ingot ..... " "	12½ to 13¼
Manganese Bronze Ingots.... " "	15½ to 16
Phosphor Bronze ..... " "	18 to 20
Casting Aluminum Alloys.... " "	16 to 18

PHOSPHORUS—Duty free.
According to quantity..... 30 to 35

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
12.00 to 12.25	Heavy Cut Copper	13.25 to 13.50
11.75 to 12.00	Copper Wire	13.00 to 13.25
10.75 to 11.00	Light Copper	12.00 to 12.25
10.25 to 10.50	Heavy Mach. Comp	11.75 to 12.00
7.25 to 7.50	Heavy Brass	8.75 to 9.00
6.00 to 6.25	Light Brass	7.50 to 7.75
7.50 to 7.75	No. 1 Yellow Brass Turnings	8.50 to 8.75
9.00 to 9.25	No. 1 Comp. Turnings	10.50 to 11.00
3.35 to ——	Heavy Lead	—— to 3.70
3.75 to ——	Zinc Scrap	3.75 to 4.00
5.50 to 6.50	Scrap Aluminum Turnings	7.00 to 8.00
11.50 to 12.00	Scrap Aluminum, cast, alloyed	13.00 to 14.00
13.00 to 14.00	Scrap Aluminum, sheet (new)	14.00 to 15.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 23.00	Old Nickel	20.00 to 23.00

PRICES OF SHEET COPPER.

BASE PRICE, 19¼ Cents per Lb. Net.

SIZE OF SHEETS. Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLER COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

ZINC— Duty, sheet, 15%.

	Cents per lb.
Carload lots, standard sizes and gauges, at mill	7.00 basis, less 8%
Casks, jobbers' prices	7¼c.
Open casks, jobbers' prices	8¼c.

Metal Prices, June 8, 1914

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect March 16, 1914, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14¼	$0.16	$0.17⅝
Wire	.14	.16	.17⅝
Rod	.14	.16¾	.18⅝
Brazed tubing	.18¾	—	.22½
Open seam tubing	.18¾	—	.22½
Angles and channels, plain	.18¾	—	.22½

50% discount from all extras as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass.... ½c. per lb. net advance
" —Best spring, drawing and spinning brass.... 1½c. " " " "
Wire —Extra spring and brazing wire..... ½c. " " " "
" —Best spring and brazing wire..... 1c. " " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.15½	$0.17¼	$0.18⅝
Wire	.15¼	.17¼	.18⅝
Rod	.15¼	.18	.19⅝
Brazed tubing	.20	—	.23⅝
Open seam tubing	.20	—	.23⅝
Angles and channels, plain	.20	—	.23⅝

Net extra as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass.... ½c. per lb. net advance
" —Best spring, drawing and spinning brass.... 1½c. " " " "
Wire —Extra spring and brazing wire..... ½c. " " " "
" —Best spring and brazing wire..... 1c. " " " "

BARE COPPER WIRE—CARLOAD LOTS.

15¼c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	20c.	per lb. base
100 lbs. to 300 lbs. in one order	20½c.	" " "
Less than 100 lbs. in one order	22c.	" " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 16c. per lb.
Seamless Copper Tubing, 19½c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
24	23	18	17	16	16	16	16	16	16	16	17	18	20	22	23

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	69

Discount 55%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Red	18c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	15c.	" "
" " " Rectangular sheets other than Sheathing	17½c.	" "
" " " Rod	15c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 23¾c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 4c. over Pig Tin. 50 to 100 lbs. 5c. over, 25 to 50 lbs. 7c. over, less 25 lbs. 9c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Gauge.	Width. Inches.	1 ton.	500 lbs.	50 lbs.	Less than 50 lbs.
20 and heavier	3-30	30c.	34c.	36c.	38c.
	3-30	32c.	35c.	37c.	39c.
21 to 24 inclusive	30-48	33c.	37c.	39c.	41c.
	48-60	39c.	40c.	42c.	44c.
25 to 26	3-30	33c.	36c.	38c.	40c.
	30-48	35c.	38c.	40c.	42c.
27	3-30	36c.	37c.	39c.	41c.
	30-48	39c.	40c.	42c.	44c.
28	3-30	37c.	38c.	40c.	42c.
	30-48	40c.	41c.	43c.	45c.
29	3-30	38c.	39c.	41c.	43c.
	30-48	42c.	43c.	45c.	47c.
30	3-30	39c.	40c.	42c.	44c.

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. No charge for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 24 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	19	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	26	30	36	
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge	000 to No.	No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb....	33	33½	33½	34	34½	35	35½	36	37	38	39	44	47	

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	18¼c.	16%	22⅝c.
8%	20c.	18%	23¼c.
10%	20½c.	20%	25½c.
12%	21½c.	25%	33⅜c.
15%	22½c.	30%	39⅜c.

GERMAN SILVER WIRE.

Quality.	Net per lb.	Quality.	Net per lb.
5%	19¼c.	15%	26½c.
8%	21c.	16%	27½c.
10%	22½c.	18%	29¼c.
12%	24½c.	30%	45¼c.

The above Base Prices are subject to additions for extras as per lists printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.